Travellers with Special Needs

Facility Design Compendium (illustrated)

TP 3608E

July 1982

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Travellers with Special Needs

Facility Design Compendium (illustrated)

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by

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TP 3608E

July 1982

The contents of this report reflect the views of the contractor but not necessari the official views and/or policies of the Transportation Development Centre.

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17. Abstract

This report analyses existing problems and presents design guidelines necessary to improve facilities in transfer for the special needs traveller.

Material for this study has been obtained through a comprehensive literature search and combined with an analysis of sampling data. Photographs, dimensions, comments, etc. were taken while observing special needs test groups during a typical transfer procedure. The testing was performed in representative air, train and bus terminals in Canada.

Test group travellers consisted of the following people: one elderly, one blind, one with hearing/speech impairment, one with upper and/or lower extremity impairment, and one confined to a wheelchair.

Transfer facilities are the key elements of intra terminal procedure required for all travellers either before or after a trip. Such facilities generally consist of: Information (eg. dialogue, signage, etc.); Service areas (eg. ticket counter, baggage pick-up, security gate, etc.); and Transfer links (eg. corridors, doors, elevators, etc.).

Specific requirements of the special needs groups and the function of appropriate terminal facilities were analyzed together. Findings pointed out the problems and determined design guidelines to improve access, service and the use of these facilities. Existing problems and the recommended design guidelines are accompanied by illustrations.

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17. Résumé

Ce rapport fait le point sur les problèmes existants et présente des lignes directrices nécessaires à l'amélioration de l'aménagement conçu pour le déplacement des voyageurs ayant des besoins spéciaux.

Le matériel ayant servi à la rédaction de cette étude a été obtenu par le biais d'une recherche documentaire poussée, assortie d'une analyse des données d'échantillonnage.

Les photographies, dimensions, observations, etc. ont été prises ou notées lors de l'observation de groupes expérimentaux ayant des besoins spéciaux, au cours d'un déplacement type. Les vérifications ont été faites dans les aérogares, gares et terminus d'autobus représentatifs au Canada.

Le groupe expérimental était formé des voyageurs suivants: une personne âgée, un aveugle, une personne atteinte de troubles de l'audition et de l'élocution, une personne ayant une infirmité au niveau des membres supérieurs ou inférieurs, ou les deux, et une personne en fauteuil roulant.

De toutes les activités qui se déroulent à l'intérieur du terminus, ce sont les services d'accueil qui ont une importance primordiale pour tous les voyageurs, que ce soit avant ou après un déplacement. En règle générale, ces services comprennent les éléments suivants: information (ex. les communications orales, la signalisation, etc.); les espaces réservés aux services au public (ex. les guichets, les carrousels destinés aux bagages; les portes de contrôle de la sécurité, etc.) et les voies d'accès (ex. les couloirs, les portes, les ascenseurs, etc.).

L'exposé des problèmes et les recommandations sont accompagnés d'illustrations.

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The library staff of the Transportation Development Centre also deserve special mention for their provision of literature and research material.

Finally, a very special "thank you" is extended to all those who participated in our site studies. Their patience, understanding and constructive comments have proved invaluable. More importantly, their courtesy has made our task a most pleasant and gratifying undertaking.

Preface

Everyone will have a need sooner or later for special help when transferring from one travel point to another. A pregnancy, a broken leg, small children, luggage in tow, a stroke, all leave their mark on us, and could prevent a worry-free trip if we ignore the needs of the disabled traveller.

It can be seen that the present day problems encountered by the special needs group are not necessarily minor ones, and they are not restricted to just that group; everyone comes into contact with these problems at some point in time.

Looking at these problems in sequence helps determine how planning and design can best be utilized to overcome these barriers.

Problems to be faced are: how information is received pertaining to perception, behavior, values and culture; and how it is presented through symbols, images and systems. An understanding of the overall problem must be communicated to planners and architects. Such design criteria as: need, function, aim, policy, and methodology (known as the functional program of design) must be taken into account.

A major problem relating to the special needs community is their lack of travelling experience. Only a small percentage of the disabled group have the confidence for extensive travel at present, which results in just a few having the ability to state their requirements in comprehensive terms. Other problems such as: the lack of adequate special facilities in terminals for the special needs population; the lack of standards to provide consistent improvements; the lack of proper training, specialized equipment and communication aids, on the part of the carriers and transport authorities, all combine to create an alienated atmosphere for many special needs travellers.

Providing useful facilities to support extended travel for the disabled is a continual process of design, application and education. It requires close cooperation between providers and users. Demands constantly change because the users' requirements are constantly changing. The challenge in designing for the special needs passenger is that it requires fundamental research, thorough testing and careful planning. Ultimately, the total travelling population benefits from this process.

In designing facilities, there must be a consciousness of both the pertinent 'mind-scale' dimensions; perception, response and effect, and of the relevant physical dimensions. The accurate identification of problems is essential. There must be built-in mechanisms to allow the planning process to react to changing needs. The emphasis must be on progressive designing and innovation, underlined by sound research and exacting analysis. There must be a willingness to work progressively with successive testing, rather than through a neat sequence of phases offering untried "solutions".

Architects, planners and designers should create the structural and mechanical environment that not only encompasses the physical and social aspects of the special needs travellers, but allows them to function to the best of their ability and to achieve their aim with dignity and comfort.

Les Designers Douglas Ball Inc. recognized a need to provide a well-coordinated system of facilities during transfer (from one mode to another or in between the same mode) which would provide such basic standards for the special needs group equivalent to those already expected by other travellers. To this end a proposal was put forth to conduct a feasibility and design study on "Transfer Facilities and a Vehicle for Travellers with Special Needs".

The approach proposed was to develop a detailed workplan, examine the range of special needs, consolidate existing literature on terminal guidelines, analyze and define the specific requirements of the special needs community, and develop design alternatives to satisfy all the requirements. Once the literature search and interviews were conducted, performance observations were carried out in various terminals including air, bus and train facilities. Representatives of the special needs community participated in these field tests, simulating procedures involved in a typical transfer and providing personal comments on the services and facilities that they utilize to effect transfer.

This report, an illustrated Facility Design Compendium, is the result of the first part of the design study on transfer facilities. The report is supported with photographs of existing facilities and is illustrated to show recommended design guidelines for improving transport terminals.

A second report will detail the conceptualized design of a unique vehicle which facilitates transfer of special needs travellers within a transport terminal complex.

Objective

The overall objective of this study is to improve access to our national transportation system for the special needs community.

Our specific objective is to compile information on transportation terminals and to design guidelines to facilitate handling of travellers with special needs. A second objective, based on the analysis of terminal design, is to provide a conceptual design of a modular transfer platform to assist mobility disadvantaged persons within an airport, rail, or bus terminal.

Scope

The approach taken to meet the objectives was to define the special needs population, consolidate existing literature, and develop design alternatives. Performance observations were undertaken at a range of terminals to assess design features and applications of new or advanced technology. Finally, concepts for a unique transfer vehicle were formulated and a mock-up of the vehicle was produced together with two publications; this one dealing with terminal design guidelines and a separate one dealing with the vehicle design. Both documents cover the full range of disabilities, not just those necessitating the use of wheelchairs.

Methodology

The first step, definition of travellers with special needs, was achieved by a combination of literature research and interviews. It was found that basically two main traveller groups exist within the special needs population. These groups are defined in further detail in appendix A, *Human Data.*

After defining the range of passengers, transfer itself was analyzed with its typical procedures. It was found that transfer consists of three main problem areas: information, service areas and transfer links, all of which require physical effort and perceptory senses. A detailed description of the transfer process is contained in section 2, *What is Transfer.*

The next step involved specifying the requirements for the special needs groupings as categorized in step one. The requirements were analyzed according to different areas such as service areas and transfer links. Again, the analysis was done by literature research and interviews with different representative institutions.

Step three dealt with the research of existing accessibility literature. Plans, specifications, and descriptions of major Canadian air terminals, train stations, and a bus terminal were analyzed.

Performance observations were then undertaken to analyze the specific problems special needs passengers encounter in typical transfer situations. A sampling observation was conducted between January 19th and February 9th, 1982, in different terminals. Emphasis was placed on use, layout, frequency of travel and transfer procedures. The airports selected were Toronto Terminal I and II, London, Ontario, Montreal Dorval (pilot test), and Quebec City. The train stations were Toronto, Kingston, and London. The bus station was Cornwall.

A different group of special needs representatives was used for each city. The groups were diversified; ranging in age from 16 to 86, men and women travellers from all walks of life, from unskilled workers to university students to professionals. A number of the participants had extensive travel experience, others limited, while still others had not ventured far from home.

At each location, the objective of the project was explained to the group.

Then representatives from the carrier explained typical arrival and departure procedures, along with policies and involvement in helping special needs passengers at each facility. In turn, each member of the test group was taken to the different facilities and asked to simulate procedure (i.e. buying a ticket, using a phone, retrieving luggage, etc.). Each member was photographed during participation, and dimensions of facilities were recorded. Travellers' comments and suggestions were also noted.

The final step for this phase of the study was the compilation of all material, the analysis of reference material, our related conclusions and recommendations.

It is evident to us that any traveller, not only the special needs group, has to be provided with fixed facilities and human assistance in order to perform transfer tasks. These two aspects are of vital importance.

Fixed facilities at present provide a multitude of problems. Our investigation uncovered the most common complaints which are described in section 3, *Design Guidelines.*

Most special needs passengers must rely heavily on human assistance where information retrieval is difficult due to their particular impairment. Labour is at a premium in most situations these days, resulting in a lack of trained personnel being available for assistance.

Poor signage and lack of proper communication systems do nothing to ease this situation. Even when good signage is in effect, crowd noise and bad terminal design often make it difficult to clearly understand public announcements.

Courteousness is a common element in providing human assistance (information service and physical effort), but where staff have not been properly trained to deal with all special needs groups, a lack of understanding and delays in responding to their needs often result.

A summary of each test site is listed. These summaries bear out the conclusions we have drawn here and pictorialize many everyday occurences that represent serious and significant barriers to the special needs traveller.

1. Introduction

Introduction

The lack of adequate special facilities in terminals to cater to the special needs population, now approaching one million in Canada and growing at double the rate of the overall population, has prompted increased concern from transport authorities as well as the handicapped themselves.

The lack of such facilities in terminals in particular have encouraged a number of letters of complaint to the Minister of Transport since 1977. A sample of twenty complaints is covered in a recent study report (TP 2751 — The Provision of Services and Facilities for Travellers with Special Needs), which covers the entire spectrum from the condition of nurseries and ladies' rooms at Dorval and Toronto to wheelchairs at five airports having all four wheels equal in diameter and not self-propellable. A functional summary review of six major airports revealed that access was severely restricted and facilities inadequate at both Winnipeg and Vancouver airports. Less serious shortcomings were identified at the remaining four terminals.

VIA Rail Canada Inc. recognized that accessibility to particular stations and facilities, in cities with high travel density, presents numerous problems to the special needs travellers, and is currently taking inventory of the situation with a view to implementing corrective action.

What few considerations have been introduced are mainly focused on the more severe problems of the disabled. But in effect, a large cross-section of the general public also experiences a great deal of difficulty in travelling. In fact, as many as half the travelling population comes under the "special needs" category — the elderly, the very young, the infirm, pregnant women, and travellers suffering from various temporary disabilities. Existing provision of aids (e.g. wheelchairs, baggage carts, moving sidewalks, etc.) do not adequately meet their requirements nor those of the permanently disabled community.

There is a need to provide a well-coordinated system of facilities during transfer from mode to mode or within modes. Ease of covering distances within terminal complexes, effective communication with service personnel, and utilization of all facilities requires more detailed consideration. This calls for uniform, improved planning for all transfer points across the country.

It was therefore considered appropriate that a study on "Transfer Facilities and Vehicle for Travellers with Special Needs" be implemented.

2. What is Transfer?

What is Transfer?

"Transfer" is the change from one transportation mode to the next. It can be as simple as leaving a car, crossing a sidewalk and entering a bus, or as complex as using an air terminal or a train station.

All tasks necessary between leaving one mode and entering the next are thus considered as "transfer".

Within the terminal, physical efforts such as: walking, moving, standing, reaching and bending, as well as information sources such as: seeing, hearing, speaking, and feeling are required to find one's way to the different service areas and to use them.

Principal questions to perform these tasks in a transfer area are:

- Where am I? (Information)
- Where to go? (Information)
- How to get there? (Physical effort and Information)
- How to use it? (Physical effort and Information)

These questions apply to almost all actions required in transfer and multiply whenever a traveller has to make many decisions. They also show the two principal concerns while transferring: information and physical effort.

After analyzing step by step transfer procedures in typical terminals, three areas are considered as key elements:

1. Information (e.g. dialogue, signage, etc.)
2. Service areas (e.g. ticket counter, baggage pick-up, security gate, etc.)
3. Transfer links (e.g. corridors, doors, elevators, etc.)

The reason for division into these key elements is twofold; first, to use them as a tool for analysis of transfer problems regardless of the size of the transfer areas or the modes; and, second, to identify specifically the requirements of each special needs group per key element.

These key elements interact and are explained here briefly:

Information: *Information consists of every visual, audio and tactile means of communication. It is used in its visual form in signage, screens, posters, sign language, lip-reading and written material; in its audio form in personal dialogues, computer dialogues, speaker systems, earphones and radio transmitters; and in its tactile form in surface finishes, shape relief maps, braille, different materials and material temperatures.*

Service Areas: *Service areas are described as such because they provide, in most cases, a service. According to the size of the terminal or its mode profile, they vary in quantity but their function usually remains the same. Service areas are: ticket counter, customs gates, immigration gates, securing gates, baggage pick-up, baggage carousels, stores and restaurants, waiting lounges, washrooms, drinking fountains and public phones.*

Service areas are usually not located in specific places in terminals; therefore, no relation could be found between them.

Transfer Links: *Transfer links connect one service area to the next. Typical transfer links are in horizontal and vertical directions.*

In horizontal direction: walkways, doors, corridors, moving sidewalks, loading bridges, etc.

In vertical direction: elevators, ramps, moving ramps, stairs, steps, escalators, lifts, etc.

An analysis of plans of major Canadian airports, train stations, and bus terminals under federal jurisdiction indicated no typical pattern of specific links between the same service areas. Therefore, each link will be investigated separately without concern to the service areas it will connect.

If each of the links are accessible or alternative routes are provided for the different special needs groups, then no matter which service areas they happen to connect, the sum of them, or in this case, the whole transfer area, will be made accessible.

What is a Special Needs Traveller?

An athlete with a cast, a veteran in a wheelchair, a pregnant woman, an elderly grandmother, a blind student, a business man with two suitcases, all have a special need when using public transport. A special need for a traveller is a way to perform one or more of the actions required by existing transfer systems at a comfortable level of proficiency, having due regard at all times to the significant element of safety.

While such people have different needs, they share a number of common problems that limit their ability and willingness to transfer. Some have physical difficulties performing tasks, such as:
Waiting/standing.
Walking.
Climbing or descending stairs.
Lifting and carrying weights up to 5 kilograms.
Reaching, handling or grasping.

Others have perception problems such as:
Seeing signs, reading video boards.
Distinguishing colours and shapes.
Hearing audio signals.
Communicating their respective needs.

The special needs passenger often avoids public transport not only because of the barriers in the system, but because of other difficulties in making transfers. In the transfer environment, barriers are compounded by moving crowds and pressure to meet schedules. Many people note that they might be able to overcome barriers if it were not for the pressure to move quickly. In addition to the hazards of stationary physical barriers, there are those of acceleration and deceleration, crowd movement, time pressure, long walking distances, reading and hearing information, dialogues and waiting in lines. The attendant tension build-up that can and does arise in many instances is, of course, immeasurable and can also be critical mentally and/or physically.

Maintaining balance on a moving walkway or elevator, climbing a flight of stairs, negotiating steps, identifying and picking up baggage are but a few of the problems to be performed while in transfer. Each transfer area has a characteristic profile of problems, although there may be some variation due to local conditions or design. The long walking distances in air and rail terminals, for example, are barriers for persons with limited strength, low energy, sensory deprivation, impaired balance, etc.

Difficulties with walking distances are frequently compounded by the need to move quickly and handle baggage. Although the danger of accidental injury, physical pressure and social embarrassment are possible in all crowds, those dangers in transfer situations are distinguished through withdrawing and not being able to cope with them. The social pressure implicit in a situation where the slower moving traveller is made to feel that he is impeding others can be upsetting for that person. The desire to maintain a schedule and to avoid delays motivates the special needs traveller like all other travellers, to proceed as quickly as possible through the trip.

Since transfer facilities are designed to accommodate the mythical average man, almost any atypical traveller exceeds the tolerances of the equipment.

Use of transfer areas requires that the traveller regularly receives and processes information about routes and schedules, as well as information about delays due to inclement weather traffic conditions, or equipment failure. Much of the information that guides the traveller is transmitted by signs and loudspeakers, and little use is made of other senses. When one or more of a persons senses do not function to capacity, transfer information is no longer received and problems are immediately created for the blind, deaf and speech impaired.

Groups of Special Needs Travellers

Since transfer consists of two main problem areas, physical effort and information, the travellers were analyzed according to their ability to cope with these problems.

It was concluded that two main traveller groups exist within the special needs population.

Group I having first to overcome physical barriers such as stairs, steps, doors and second to cope with information (e.g. a wheelchair user able to orientate, but not able to cope with a ramp).

Group II having information retrieval problems as their first priority with the physical effort being secondary (e.g. a blind person not able to orientate, but able to walk).

These groups had to be sub-divided since within each group there is a great variety of disabilities with different requirements.

Group I
Physical Problems

Lower Extremity Impaired	Upper Extremity Impaired

Group II
Perception Problems

Sight Impaired	Hearing Impaired	Speech Impaired

Each group then has a varying degree of impairment and it was necessary to make a distinction e.g. between a totally blind person and somebody in the same group not able to define colour properly, because their requirements might differ completely. (A colour blind person can still see a message on a screen, whereas a blind person relies on audio help or tactile information).

Group 1
Physical Impairment
(Lower Extremity)
a) Total impairment with aid;
(Wheelchair)
b) Partial impairment with aid;
(Crutch, cane, walker, brace, artificial limbs, special shoes)
c) Partial impairment without aid
(Paralysis, cardiovascular disorders, bronchial and respiratory problems, arthritis, and age-related disabilities)
d) Temporary impairment
(Through trauma, disease, condition or accident)

Group 2
Physical Impairment
(Upper Extremity)
a) Total impairment with aid;
(Artificial limbs or other devices)
b) Partial impairment with aid;
(Part amputation with prothesis)
c) Partial impairment without aid
(Paralysis, cardiovascular, bronchial, aged-related disabilities, multiple sclerosis and thumb or finger missing)
d) Temporary impairment
(Through trauma, disease, condition or accident)

Group 3
Perceptual Impairment
(Sight)
a) Total impairment with aid;
(Seeing eye dog, cane, electronic device or other)
b) Partial impairment with aid;
(Cane, special glasses or other)
c) Partial impairment without aid
(Colour blindness, reduction in the visual field, etc.)
d) Temporary impairment
(Through disease, accident, etc.)

Group 4
Perceptual Impairment
(Hearing)
a) Total impairment with aid;
(Lip-reading, sign language, visual ear)
b) Partial impairment with aid;
(Hearing aid)
c) Partial impairment without aid
(Age related)
d) Temporary impairment
(Through disease, accident, etc.)

Group 5
Perceptual Impairment
(Speech)
a) Total impairment with aid;
(Larynx-phone, sign language, tele-printer)
b) Partial impairment with aid;
(As above)
c) Partial impairment without aid
(Stammer, sutter, tongue-tied, hare-lip, cerebral palsy, spastic)
d) Temporary impairment
(Through disease, accident, foreign language, etc.)

Note: For the sampling observation test it was discovered that there is seldom just a speech impairment; in most cases hearing and speech problems are combined. Since in almost all groups, age-related physical and perception problems occur, we included a "typical elderly" person in all observations. The groupings for the test were:

1. Lower extremity impaired, e.g. wheelchair.
2. Upper extremity impaired, e.g. prothesis.
3. Elderly with reduced physical and perceptual functions.
4. Sight impaired.
5. Hearing and/or speech impaired.

Physical Impairment

Lower Extremity Impaired

People with an impairment of their lower extremities often use a wheelchair as their aid. The traveller in a wheelchair has actually three handicaps to overcome. First, he has a disability that invariably, because he is confined to a wheelchair, is severely handicapping. Second, he is obliged to operate at a lower height than standing people (and always at the same height), which is constraining both physically and psychologically. Third, he wheels around in a cumbersome, awkward, space consuming, distinctive vehicle. Reasons for using a wheelchair are results of a variety of disabilities: permanent causes are congenital, polio, muscular distrophy, multiple sclerosis, single or double lower limb amputation, paraplegia, cerebral palsy, hemiplegia, and arthritis; temporary causes include broken limbs, weakness due to age-related ailments, or pregnancy. The lower extremity impaired group usually require lower counter heights, free knee-space, hard floors and communication to take place at a lower height.

Wheelchairs, which come in many shapes and sizes, are adapted to the needs of the user. They range from basic folding models to custom-designed electric wheelchairs.

Travellers with a less than normal function in the lower extremities often use aids such as canes, braces, crutches and walkers. Their physical capacity to walk, cope with stairs, moving sidewalks or just waiting in line is often minimal. The limitations may result from various disorders such as bronchial and respiratory problems, arthritis and age-related disabilities. The elderly face a general reduction of their physical, emotional and mental coping abilities and are therefore represented in all five groups.

Temporary impairment is often caused by disease, accident or condition. An athelete with a cast or a pregnant woman is usually able to perform almost all tasks except moving quickly in crowds, carrying heavy baggage or standing in line for an extended time.

Upper Extremity Imparied

People with impaired upper extremities can be born impaired (e.g. without arms) or can become impaired later in life through accident or disease. Some are able to use artificial limbs, others have no limbs at all and use their lower extremities instead. Handling doors, picking up and carrying baggage, using washrooms, public phones, ticket counters and restaurants are problems this group faces.

If the impairment is only partial, e.g. one arm amputation or one artificial limb, these travellers have usually developed a strong ability to use the remaining arm to perform all functions. A prosthesis is an assist, but does not carry out main functions.

Partial impairment without aid includes passengers with paralysis, cardiovascular problems, multiple sclerosis, heart and lung disorders, arthritis, polio, missing digits, and age-related problems. These passengers must avoid sudden stress or prolonged exertion; they are not able to climb stairs, gradients or steep ramps. Stiff joints require the person to move slowly. Most in this group have problems of balance, holding on to rails, and might have some uncoordinated movements.

Temporary impairment is often caused by accident or disease. Casts, slings and other devices prevent these travellers temporarily from using one or two of their upper extremities. Reaching, holding on to rails, using washrooms, faucets, controls, and public phones all require a certain adjustment. As soon as aids are necessary, the space, required around these passengers for movement and distance, increases.

Perceptual Impairment

Sight

In general a person is considered blind if his visual acuity is less than 20/200, e.g. if he cannot read at a distance of 20 feet a test card that normal vision could decipher at 200 feet. People with 20/200 to 40/70 vision may also be defined as blind, if the field of vision is less than 20 degrees or other complications are present. Often, those who are considered blind will have varying degrees of residual sight and may be able to discern some *light, shapes,* and *colour.*

The greatest problem is for the blind over 60. With the steadily increasing expectancy of life, it is likely that the number and percentage of elderly blind and sight impaired will continue to increase. It is also likely that with advancing old age, some might lose mental and physical capabilities.

It is becoming apparent that the number and percentage of travellers with additional handicaps is also increasing and will present problems in transport, education and employment. For a number of sight impaired persons, blindness may only be secondary to complex physical, mental and emotional problems.

Generally, the problems and difficulties of a person who is adventitiously blind arise not only from the absence of sight, but also from secondary consequences; loss of mobility, loss of income, changes in personal relationships, loss of independence, increased loneliness, frustration and depression.

For the congenitally blind, there are no transitional problems from the world of sight, but there is an increasing realisation and acceptance that there is a normal sight experience which is beyond their reach. For the elderly whose sight gradually deteriorates, blindness may be only one of many other problems of age. Sight impaired travellers usually face two problems: communication and mobility.

Communication

Sight impairment reduces communication through isolation. A wide range of techniques and services is available to replace the written word, but sight impaired persons must be trained to use these facilities.

Mobility

The other major problem of sight impairment is to overcome the restriction of movement that this impairment may impose.

This group has to learn new techniques and must develop confidence to move within a terminal with assurance.

Research into methods by which the blind use location and direction clues, has shown that a wide variety of audio, tactile and kinaesthetic senses are used. Many blind use route memory, in which changes of direction, speed or function are associated with memorized clues.

These travellers require:
- Hard surfaces which provide some echoes in circulation areas.
- Projections into circulation areas to be avoided, particularly above hip and below head level, where they cannot be detected by a cane.
- Doors that do not open into circulation areas; sliding doors are preferable.
- Staircases with handrails on both sides, with short guiderails at the beginning of the stairs and a change of floor finish one metre from head and foot of stairs.
- Hazards to be adequately guarded.
- Balustrades, window sills and quardrails at waist level.
- Non-slip floors and no loose floor coverings.
- Information through audio and tactile aids.

Braille is used by only about 6% of the people officially termed blind. There is an electronic system available that changes printed letters into vibrating tactile shapes that can be read with the index finger. Speech synthesizers present printed material in a manner which is audible.

Many blind people use 'travelling books', written material on tape recorders. Also available are talking calculators and speech compressors that enable people to speech-read by ear. Blind travellers most commonly use white canes, laser canes, guide dogs and companions when travelling.

Identification and pick up of baggage, orientation in new terminals, reading maps and identifying slurred announcements are some of their biggest problems.

Partial sight impairment includes travellers who can usually identify shapes and read large print, but they might be colour-blind or their field of vision reduced. Magnifying devices and closed-circuit televisions that enlarge words from 4 to 60 times are available and can use multiple colour contrast as well as different letter types.

Temporary impairment is usually caused by accident or disease. A patch over one eye reduces, somewhat, three dimentional sight, but reduces only slightly the capability of passengers in transfer.

Visual impairment or absence of vision creates a greater dependence on the other senses. Therefore, the audio and tactile sensory channels are used more and these should be stimulated, when providing an aid.

Hearing

Few people really understand deafness. This is mainly because the handicap of the deaf and hard of hearing is less evident than the handicaps of the blind and the wheelchair-bound, and it does not attract the same attention. People tend to be rather impatient with the deaf. In history the deaf were, in fact, often regarded as idiots, an affliction that spelled death in ancient Greece and Rome.

A deaf traveller is someone who requires communication methods when little or no natural speech or language has been acquired.

Statistics show that an increasing number of people have impaired hearing. In addition, there are those people with multiple disabilities. Additional handicaps include: blindness, physical disabilities, mental deficiency and conditions arising from emotional problems.

A person who was both deaf and blind once said: "Deafness is a much worse misfortune than blindness, for it means the loss of the most vital stimulus, the sound of the voice that brings language, sets thoughts astir and keeps us in the intellectual company of man!".

Deafness originates from either congenital or adventitious causes and each case creates quite separate problems. The congenitally deaf person is deprived of the normal method of learning, first hearing and imitating sounds and spoken words, then gradually forming associations to learn the words and eventually acquiring a vocabulary.

These people need a special means of communication, because they did not learn to speak by a natural growing process.

With adventitious deafness, especially if it happens after the age of five, the problems and difficulties differ to those of the congenital deaf. They may not arise so much from the actual hearing loss but from the partial lack of independence and limited spontaneous contact. This often leads to a change in personality and a sense of isolation from social and cultural activities. Feelings of frustration and depression usually result.

Partial hearing impairment usually means that an individual cannot perceive certain frequencies of sound. He might be able to use a certain amount of speech and language.

Although a variety of hearing aids are available and many can be beneficial to the hearing impaired, they do not correct the user's condition. Hearing aids simply amplify all sounds thus lessening the severity of the loss.

Sign language is used in combination with movements and hand positions to express thoughts and ideas. If there is no sign for a certain word, finger spelling can be used. This is an action by which letters are formed by the hand.

Pencil and paper, or electronic devices are used to overcome communication needs.

Technical devices such as the visual ear are available and these have been used to transmit a typed word over the phone.

Unable to use their hearing, these travellers rely on visual and other sensory signals. Whichever form of communication is used: e.g. lip-reading, sign language, finger spelling or written language, deaf passengers can normally express themselves and can be understood by hearing people, when both are willing to try.

Speech

People who are completely speech impaired are mute. They can be born mute or may have lost their speaking abilities by accident or disease.

Very often there is a direct relationship between hearing and speech impairment. Since the process of speaking requires hearing first, people who are deaf sometimes have difficulty speaking. It is not the fact that they are physically unable to speak, but often have no audible feedback for what they are saying. If people in this group are only impaired in speaking, their visual and audible senses can be used. Their biggest problem is therefore personal communication through dialogue, such as is necessary in service areas like ticket counters, customs, security, immigration, information booths, restaurants, stores and in general orientation.

In cases of speech impairment, such as cerebral palsy, stuttering, stammering, hare-lip and tongue-tied, travellers experience a limited use of their skills. The patience and willingness of others to help are often enough for them to overcome certain communication difficulties.

There should be provision of additional equipment to assist the hearing and speech impaired. This might consist of such electronic devices that transmit printed words, synthesis speech, and amplify the larynx. A pencil and paper should always be available and, on the part of personnel, a familiarity with some basic sign language and/or finger spelling is recommended.

Temporary speech impairment is found often with travellers who have a disease, have had an accident or speak a foreign language. Since these people are not subjected lifelong to this impairment, they can use the same provisions as the permanently disabled and adapt for short times to the new circumstances.

3. Design Guidelines

Problems
Function
Standards
Design Guidelines

1

Orientation Signage Information

AIR CANADA Departures
AIR CANADA Departures

Problems

Main entrances are not always obvious to travellers.

Often insufficient information is provided immediately on entering a terminal building as to which facilities exist, how they can be located and if they are accessible, on the ground floor or otherwise.

In some instances the type of signage, pictograph and colour coding that is used do not help to reinforce the information which is being given. Confusion and disorientation can result for the special needs traveller.

Not being able to locate a required facility within a certain period can cause frustration, fatigue escalating nervous tension and the possibility of a missed connection.

Standard systems of signage and symbols are not always used in relation to transport. The significance of uniformity in this regard cannot be over-emphasized.

Generally there is a lack of information, direction, and orientation aids for the sight impaired and other special needs travellers.

Function

Mainly to assist travellers in finding their way through respective terminal buildings to transportation mode. Used also to locate facilities and services within general transfer areas.

Essential informative directional aids may be visual, audible, tactile or other means whereby the traveller is provided with certain cues as to where they are, where to go, and how to get there in the safest, simplest and quickest manner.

Standards

1. If directional signs are used, they shall be located to provide maximum visual exposure along routes of travel to destination.

2. The colour of characters and symbols shall contrast with their background. Red on green, or green on red shall not be used.

3. Position at eye level: 1200 mm seated and 1600 mm standing.

4. Use international symbol of accessibility for handicapped persons. When displayed on a building, this sign indicates to the special need traveller, that they will have reasonable freedom of movement within that building. An arrow can be added to either side of the symbol to indicate direction of travel or the location of an accessible facility or entrance/exit.

5. Use safety colour code based on standard 1-GP-12C colour code numbers. Use the following colours: yellow (505-101) for warning or danger. Green (503-107) for safety and first aid equipment. Black (512-101) or white (513-101) for traffic and housekeeping.

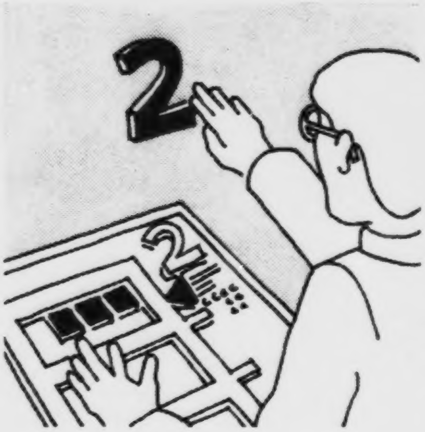
6. All other colour selections should be based on the fact that orange and yellow are more easily distinguished by the colour blind, and blue, red, green and violet with more difficulty.

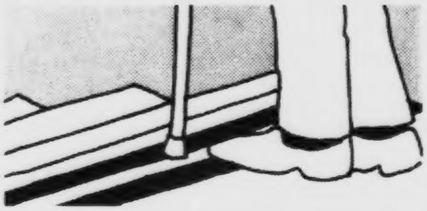
7. Use the following shapes: circle for Danger and Prohibition; triangle for Attention and Warning; rectangle for Information.

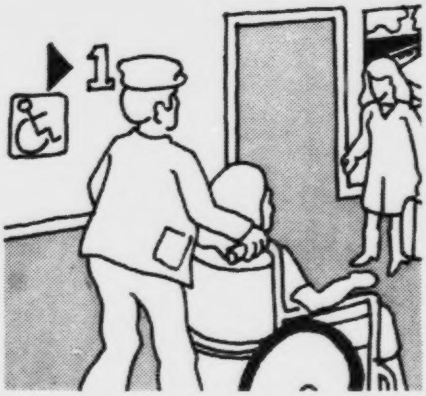
8. Emergency exit door openers shall have tactile signals. These signals shall be a textured surface on parts of the opener that come in contact with hands. Textured surface shall be standardized throughout a building or facility.

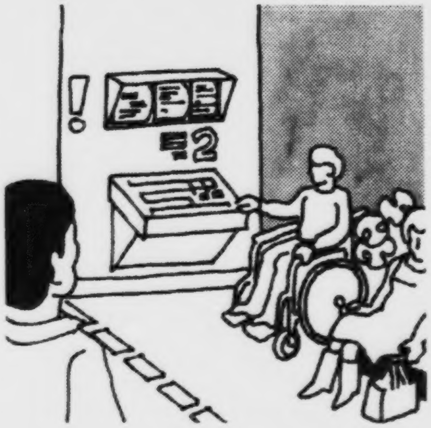
9. Audible emergency alarms shall produce a sound level which exceeds the prevailing equivalent sound level at intended listeners' ears by at least 15 decibels or exceeds by 5 decibels any maximum sound level having a duration of 30 seconds, whichever is louder. Alarm signal sound levels shall not exceed 120 decibels.

10. Visual alarms, supplementing visual paging, should be provided for the deaf. If provided, illuminated emergency exit signs shall flash as a visual emergency alarm in conjunction with activation of audible emergency alarms.









Design Guidelines

In terminals with a relatively small number of movements, visual aids could be backed up by audio information.

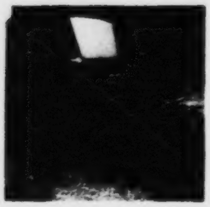
In terminals with a high number of movements, audio information might lead to confusion. Blind people or travellers with visual impairments must therefore rely on information desks, orientation areas, tactile cues and assistance from personnel to find their way in a transfer area.

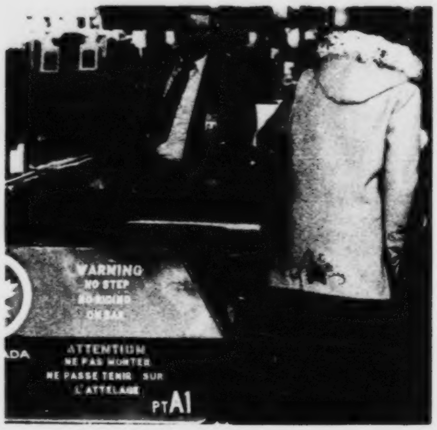
Whenever possible, use raised letters for the blind (less than 10% of blind persons read braille). Letters should be at least 15 mm high and raised 1 mm off the surface.

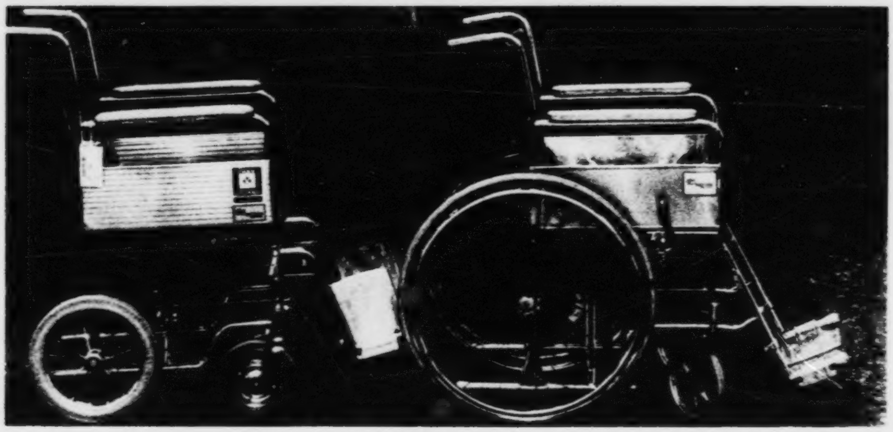
Place tactile warning signals to be detected by cane or feet on walking surfaces. These warning signals should be: non-skid strips running perpendicular to the path of travel, about 25 mm — 50 mm wide and 3 mm high, separated by 6 mm — 20 mm wide gaps. These strips should have same length as ramp or staircase width. These strips should be present at the top and bottom of each staircase and ramp for a length parallel to the path of travel, of 600 mm — 900 mm. No other walking surface on the site or in the building shall have the same pattern as the warning signal. Care should be taken to use strips made of material which the blind perceive as having a difference in hardness with the rest of the floor.

Provide CRT display screens with close caption system for sight-impaired. Provide audible and visual paging signal when message and/or information is to be transmitted. Provide a point or points for receiving this information by speech, sight impaired and other special need travellers at all terminals.

2 Mobile Transfer Equipment







Problems

For the traveller with special needs certain mobility aids are required in transfer. The basic equipment provided by the carrier to aid elderly and other semi- or non-ambulant travellers is the wheelchair. This is normally available on entering a terminal and is provided with an attendant. As it is used on a one to one basis it can therefore take up valuable personnel time when there is a demand for a number of such chairs.

Electric vehicles, whether of the small type which can go onto a loading bridge and virtually up to a plane door with special needs passengers, or of the longer, articulated type suitable for carrying more passengers, pose problems for the passenger. Both vehicles have high steps between 230 mm and 300 mm, and because of this fact the special needs passenger always requires assistance when boarding the vehicles. Generally, these vehicles have not been designed with the disabled in mind. Also they are not available for use in the public areas on the other side of security; this limits the effectiveness of such costly equipment while the need may still pervail.

The special needs passenger is often taken to the security gate assisted in a wheelchair if he/she is non-ambulatory.

Other equipment such as a baggage cart is often available with or without a charge, for use by travellers before check-in and after arrival. Nothing is provided to assist elderly and other special needs travellers with their hand luggage, crutches and other paraphenalia associated with mothers, sports enthusiasts, businessmen or the physically and perceptually disabled. Not enough personnel are available to take care of the specific needs of all these travallers.

Luggage carts are often of a standard design, except that some do have locking systems that operate when the handle is released. For the elderly, the pressure required to control such a cart is often too great, especially if the person suffers from arthritis. Because of the casters used, they are not suitable for single handed manoeuvering.

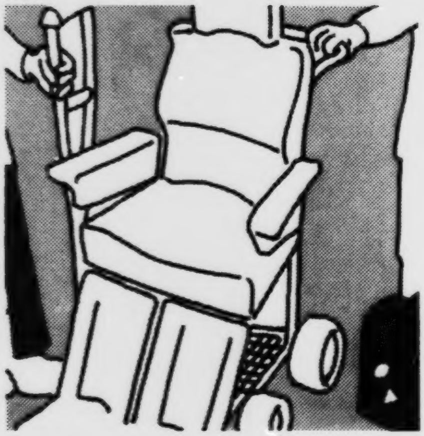
Wheelchairs are of all types and require an attendant to push them as they do not always have handrims. They take up considerable room when collected together and they are usually fixed so not to fold.

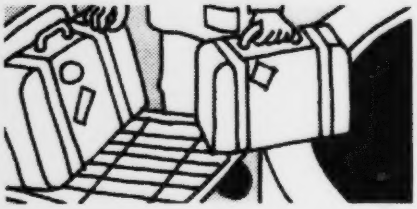
Function

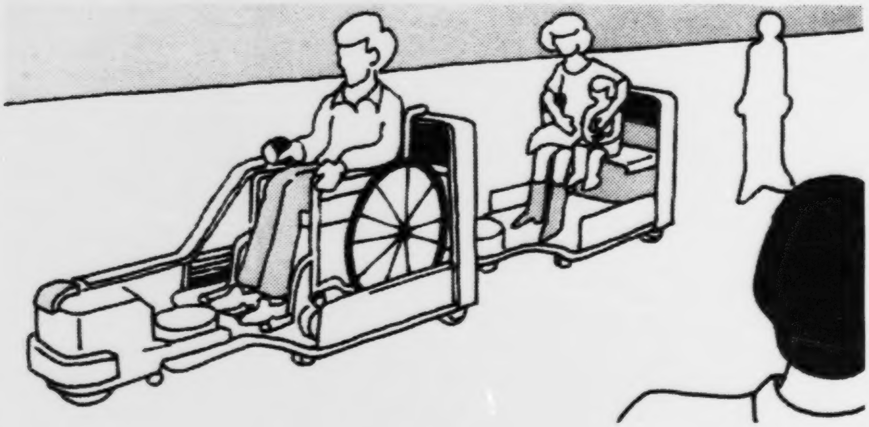
Powered or non-powered equipment to facilitate transfer of travellers and their hand luggage within the terminal building. This equipment generally consists of electric passenger vehicles, luggage carts used by passengers and carrier — supplied wheelchairs.

Standards

No standards available.







Design Guidelines

The following vehicles and equipment must be considered obligatory for any airport and/or surface transport terminal: transport authority owned wheelchairs and vehicles will be on loan to passengers unable to walk long distances, as well as to passengers who, for one reason or another, cannot use their own private wheelchairs.

There should be a sufficient number of airport-owned wheelchairs or other mobile transfer equipment with the following design criteria:

- ease of getting on and off
- high backrests
- vertically adjustable footrests
- detachable armrests (for ease of transfer from a wheelchair, or if person is semi-ambulatory)
- at least two different seat widths
- self-propelled or powered
- place for hand luggage and other items (e.g. crutches, baby things, ski boots, seeing eye dog, etc.)
- efficient use of personnel
- ease of storage and maintenance
- ease of operation and of a simple design so as to discourage misuse
- suitable for all special needs travellers (i.e. in a wheelchair, semi-ambulatory, partially sighted, parents with children, etc.)

Depending on various prevailing conditions at an airport or other transport terminal, the practicality of the use of vehicles and equipment capable of transporting the disabled person with or without a wheelchair within the terminal building should be closely examined.

3

Doors and Doorways

Problem

Main doors are not always accessible and/or not clearly marked. Service entrances are often the only entrances accessible to the disabled in a wheelchair. Because of this, the confined traveller is deprived of an alternative route when emergency evacuation is necessary.

For travellers such as the elderly, lower extremity, sensory and temporary impaired, important design factors are often overlooked. These are: door position, ramps, landings, hand and guardrails, open/closing systems, door type and weight, threshold, mats, grates, signage and cuing. When such items are not considered, a so-called accessible door becomes a hazard to the disabled and unsuspecting traveller.

Function

To provide easy access from the outside, through the building fabric to the inside. They also permit movement between internal rooms and spaces.

Standards

1. Main doors shall be of the transparent type, with safety marking or logo at 1200 mm and 1600 mm of height. Automatic doors or doors equipped with a closing device shall remain open at least five seconds, or be equipped with electronic eye, pressure mat or other detection device.

2. Where a revolving door is fitted, an accessible door shall be installed nearby that is also operable from the outside.

3. Doorways should have a minimum clear opening of 810 mm. This can be reduced to 762 mm for wheelchairs approaching straight on. Where two door leaves are used, one half shall provide clear opening width of 810 mm.

4. Doors with a closer shall close in not less than five seconds, from an open position of 90°.

5. Where doors or openings are located at right angles to a hallway less than 1015 mm in width, doors or openings shall provide clear opening not less than 865 mm. All others shall provide at least 762 mm clear opening.

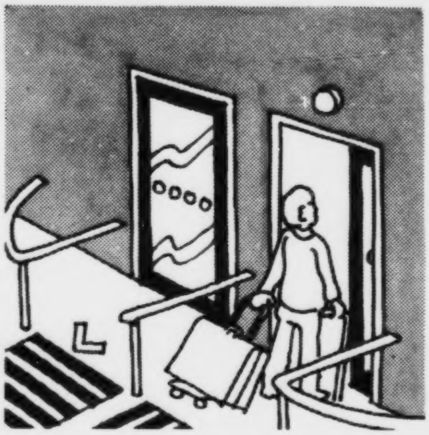
6. Doors shall be opened by horizontal or lever type handles and operable by a single hand. Knobs shall not be used. Door opening pressure shall not exceed 22.5 N.

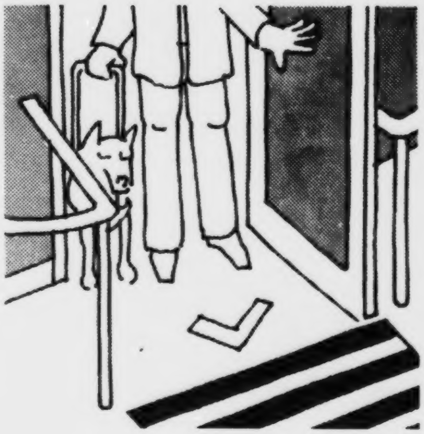
7. Thresholds over 10 mm must be ramped at 30° angle.

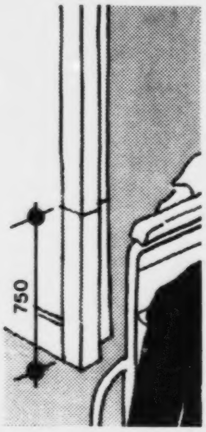
8. Accessible doors and routes shall be identified by proper signs such as international symbol of accessibility.

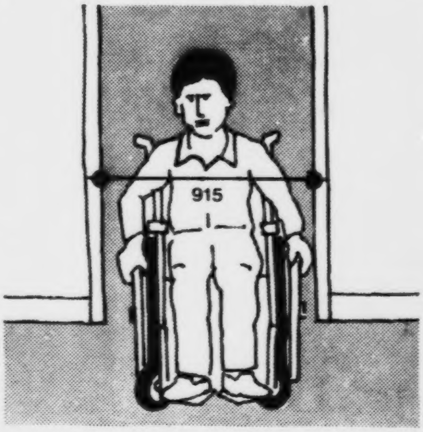
9. Double doors shall not have a column down the middle. Lighting at doors at 200 lux (preferably 300 lux).

10. For a manual door with the latch side adjacent to a wall or counter, there shall be a distance of at least 300 mm separating the latch edge of the door from the wall (or counter) to permit easy opening of the door by wheelchair users.









Design Guidelines

At least one entrance, if possible the main one, should be without steps. Provide automatic sliding doors where feasible, especially for main terminal access. Main terminal access should be usable by everyone. Secondary access may differentiate regular and special routes.

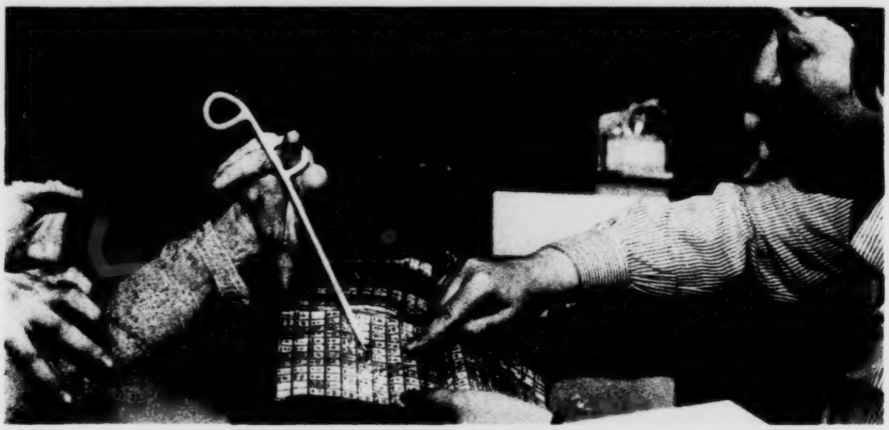
Building entrances and exits should be level on both sides of automatic doors. Doors should be designed so that they do not conflict with traffic flows. Automatic sliding doors are preferred to swing doors.

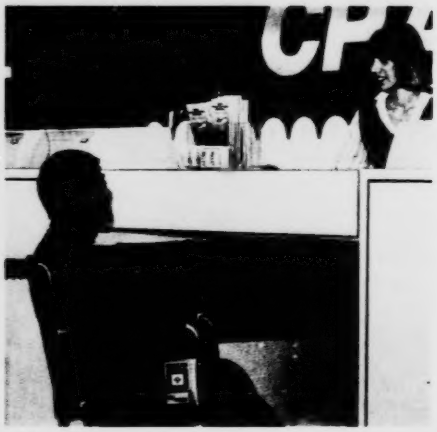
Where provision is made for disabled people, particularly wheelchair users, careful attention must be given to the placing and specification of doors. Matters such as the width and weight of doors, whether they open in or out, and whether they are hinged in the corner or away from the corner, can be critical. Doors in a corner position should permit easy approach.

If a door stop causes rapid rebounding, injuries may occur. Door stops should be mounted near the top of the door so that they do not cause tripping. Automatic door closers should be adjusted to make opening doors easy. Doors should be made to close slowly.

Door and jamb edges should be rounded or cushioned up to 750 mm high to minimize scissor cutting and smashing of fingers. Strike plates and push bars must not catch clothing. For the elderly, seeing impaired and children adequate cuing and hand/guard rails are important for the approach to any door. For automatic doors that swing in one direction a tactile warning should be adopted as a standard in all terminals and stations. This warning should indicate entrance or exit and be placed on both sides of the door. Guardrails should prevent all travellers from going across the path of an opening door.

4 Information Counter Ticket Counter





Problem

The ticket counter is often awkward or impossible to use by disabled, elderly or short people. In many cases the writing surface is too narrow or non-existent. Most are not suitable for use by disabled confined to wheelchairs. Therefore, these people are unable to transact business in a comfortable and dignified manner.

The location of such a counter is seldom made known from the beginning of travel procedure. Adequate information is often lacking for sight impaired when they are in the vicinity of the counter. It is important to show, using tactile means, where the position of the agent is located and whether his/her position is occupied.

For upper extremity impaired, the difficulty is in manipulating documents or writing (i.e. the physical effort required and/or the inadequacy of the surface). There is usually no place to leave handbags or other belongings while using counter.

For the elderly, the short and the person confined to a wheelchair, the counter is often too high to use comfortably and in some cases not at all.

For the lower extremity impaired if he/she is using a cane or crutches there is usually no place to put these items and/or a suitable surface or aid to steady oneself during a transaction.

Function

Separating element between traveller and personnel over which communication and/or a combination of the following activities take place: request for information; identity of traveller made known; currency exchange for ticket or ticket shown; weighing and labelling of baggage.

Standards

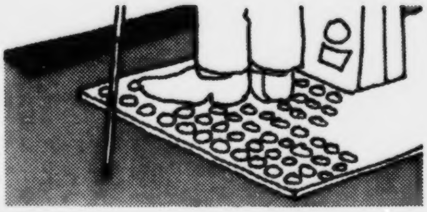
1. Counters, generally, shall not be higher than 1100 mm.

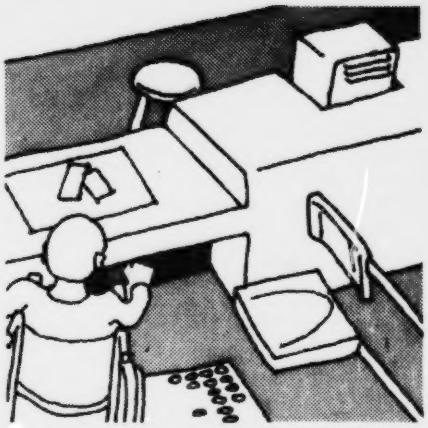
2. If service counters are higher than 900 mm, then an auxiliary counter, or other transaction space offering the same services, should be provided. This should have a height of 800 mm with a clean space under the counter; 900 mm wide, 500 mm deep by 750 mm high with additional foot space 150 mm deep by 250 mm high.

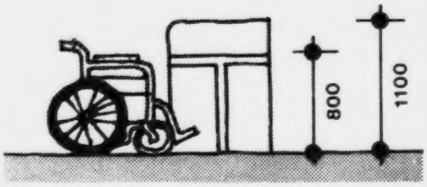
3. On a standard counter, provide a place at least 300 mm deep by 600 mm and from 650 mm to 900 mm from the floor, to rest parcels and handbags while buying tickets, etc.

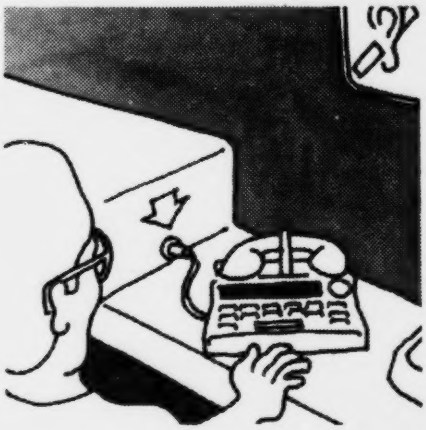
4. There shall be no protruding sharp or abrasive surfaces under all accessible counters.

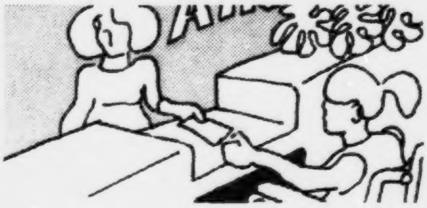
5. All service counters shall be illuminated at a level of at least 200 lux.











Design Guidelines

Information desks should be close to and visible from building entrances to provide early information and if necessary, help. The area where they are located could be identified by floor markings for seeing impaired travellers.

Routes to information desks and check-in counters should be short, direct and self-evident and, if possible, on the same level as the entrance.

The design of desks and counters must be such that no difficulties in communication between disabled travellers and staff occur. Effective communication aids should be made available and/or used here. In the design of a counter an appropriate surface/space (possibly pull-out with non-slip surface) ought to be provided for the use of such aids (e.g. writing tablet, braille documents, visual ear, communication charts, etc.).

As far as possible, furniture should be suitable for disabled as well as ablebodied travellers. At least a segment of an information desk or a portion of a counter group should have a height suitable for wheelchair users with toe recess. Facility for supporting cane and/or crutches should be provided here. Where information desks and ticket/check-in counters are reserved for special needs travellers these should be clearly marked with the international symbol of access and an appropriate sign for those with sensory disabilities should also be installed (e.g. hearing impaired).

Counters for wheelchair users and other disabled travellers must be staffed by appropriately trained personnel.

Counters should be accessible for customers who cannot stand for a long period or who are much shorter than average, and it is recommended that a jump seat be incorporated in the design.

5

Telephones

Problems

If positioned away from main circulation routes and in obscure places people with stamina and mobility limitations have to make unnecessary and exhausting journeys to use equipment. The sight impaired can have difficulty in locating them.

Those people with incoordination and manipulative problems often find coin deposit, receiver grasping, dialing and coin retrieval quite difficult. The directory is often hanging and usually requires two hands to use it. The shelf is often too short to be practical and there is no place to rest receiver while using it. Lighting is sometimes quite poor in the area of the telephone. Coin deposit can be so difficult for some disabled people that they loose their call in the process.

Pay telephone enclosures can project into circulation spaces, creating hazards for those with severe visual impairments. Some public telephone enclosures have entrances which are too narrow for wheelchair entry.

A lowered phone, which provides full clearance for a wheelchair user does not necessarily mean that the coin slot is accessible to the elderly seated or others. The arrangement of functioning elements on a conventional telephone is not a good one for the special need user.

Function

Electronic device for verbal and audible communication, over a distance, between two able people. A service charge paid in advance directly into the unit activates it and the person makes connection with second party either manually or through operator.

A mouth/earpiece is provided for sending and receiving dialogue. A directory of numbers is usually provided. Coins deposited can be retrieved after unconnected dialing.

Standards

1. Shall be identified as accessible to and usable by people in wheelchairs and people with hearing impairments.

2. Shall be provided with unobstructed access to within 300 mm of the front of the telephone with such access not less than 800 mm wide. Bases, enclosures and fixed seats are not to obstruct access. Ensure that acoustic enclosures do not constitute a hazard to people with seeing difficulties, e.g. an enclosure which is cantilevered from the wall in such a way that it will not be detected by a cane.

3. For the average seated adult in a wheelchair the dial height shall be 1067 mm, the receiver shall be at 1016 mm, and the coin slot at 1219 mm. This telephone can be approached parallel.

4. Provide a hearing aid coupler core on the handset and an amplifier. Provide an official sign to identify these aids.

5. Telephones for use by persons with hearing difficulties shall be designed so that they may be used by persons with or without hearing aids.

6. Have a small shelf for special hearing devices such as the visual ear.

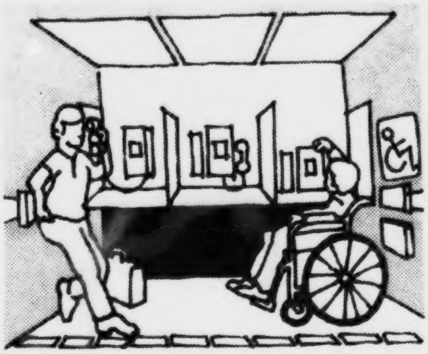
7. The minimum dimensions of booth or phone area shall be 1250 mm long by 800 mm wide.

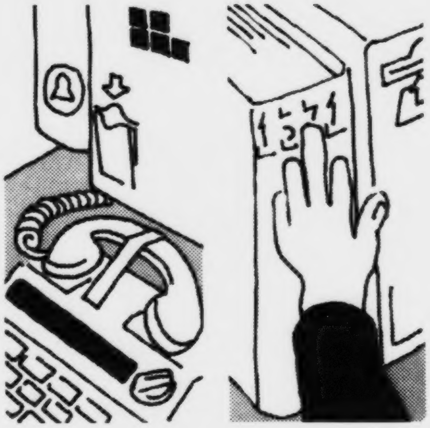
8. Have push button controls where such equipment is available.

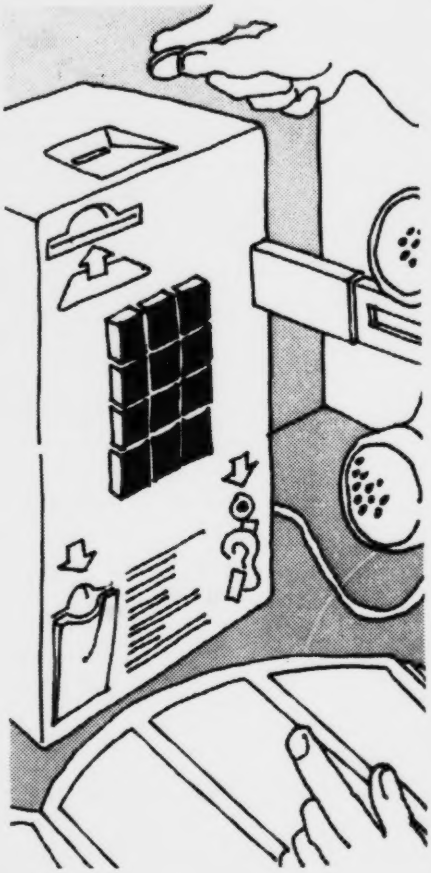
9. A directory should be placed 750 mm above the floor for head on access or 700 mm for parallel access. Design directory holder for one-handed use.

10. Provide at least one telephone in five, with a minimum of two telephones per group, to the standards as mentioned for accessibility to the special needs user.

11. If a booth or enclosure is provided, it shall be located so that it can be entered by a person in a wheelchair or with other mobility aids and shall be suitably identified for use by special needs persons. If more than 3/4 of all telephones are accessible, then they need not be identified.







Design Guidelines

To facilitate orientation the telephones for special need users should be located adjacent to or grouped with normal telephones.

Teletypewriter and/or visual ear service for the deaf should be available on request. Each accessible telephone should be provided with a shelf to take visual ear and a power point which can be plugged into. Such a phone should be identified for use by the deaf with an official symbol and/or pictograph. It is recommended that equivalent facilities for the deaf be provided at a conventional standing height and also one at seated height so that it can be used by a hearing impaired wheelchair user.

Telephones only equipped with separating partitions or without any partition offer the best accessibility. Those within cabins offer best opportunity for providing effective amplification for the benefit of those people with hearing problems. Wall mounted phones for use by hearing impaired should be provided with acoustic baffling to prevent interference from external noises.

All telephones should be compatible with hearing aids.

Directories should be accessible and easily manipulated by one hand. Instructions for use of coin-operated telephones should be accompanied with a tactile and pictograph equivalent. When operator requests number from where call is being made, blind or partially sighted person should be able to recognize it. Illumination generally over all telephones should be a minimum of 300 lux. The coin slot, dial/buttons, receiver craddle, coin retrieval, and directory should be designed so as to facilitate all those special users with problems of dexterity and sight.

6

Interior Circulation Areas

Related Spaces
Connecting Passageways
Loading Bridges

Problems

In most terminal buildings the problems for disabled travellers often stem not from the architecture of spaces and passageways, but from the relationship of services and facilities to these areas.

A great, unobstructed main hall is often considered ideal for the movement of large numbers of people. Using this space can become a tiring and confusing exercise for someone who is elderly or disabled.

Without adequate signage, information, rest and orientation places along a main route the confused and burdened traveller soon becomes an obstacle to others. Just as the blind can soon become disoriented and proceed from one obstacle to another, the wheelchair traveller is not always shown the shortest accessible route from when he enters the terminal. Also, too frequently, the availability of assistance and the position of such help is not indicated at relevant orientation points.

Function

To enable travellers to proceed, whether on their own or assisted, to/from the appropriate transport mode. To permit use of public spaces, services and facilities provided within the terminal building without pressure, obstacles or conflict with other travellers or transport personnel.

Standards

1. Minimum width between any two structures or fixtures in public aisles 1100 mm.

2. Passageways are free from projections to a height of 1980 mm. Wall projections into path of travel maximum 100 mm permitted.

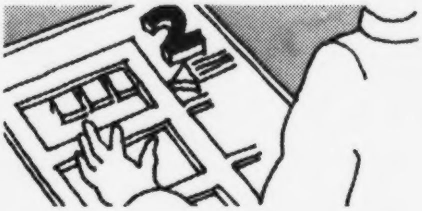
3. Such passageways shall not be interrupted by abrupt changes in level except where ramps are provided.

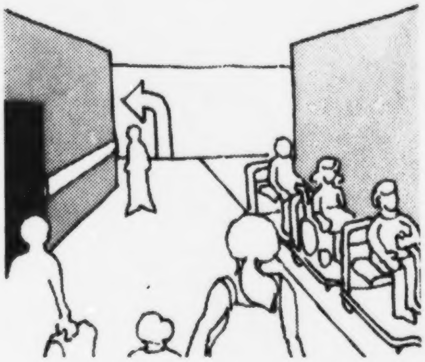
4. Where turnstiles, controlled check-out lanes, or other restricted passageways are constructed to control flow of pedestrian traffic, there shall be at least one obvious, equivalent facility usable by persons in wheelchairs.

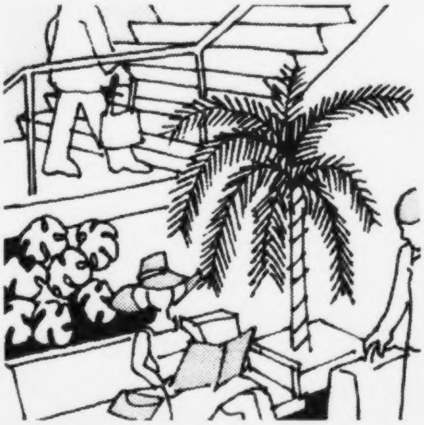
5. Doors shall be located to provide sufficient space to manoeuvre a wheelchair on both sides of the door.

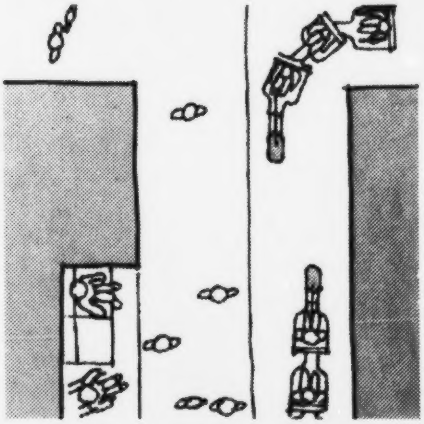
6. Minimum distance between two hinged doors in series is 1250 mm. Some reduction is possible for wide lobbies in existing buildings. Where possible, avoid double doors in washrooms.

7. Seating shall be provided maximum 30 m intervals in long passageways.









Design Guidelines

A plan of public circulation areas and routes should be provided at main entrances and orientation points. Services and other public facilities should be clearly indicated on the plan.

Main direct routes should be shown in a tactile manner so as to assist the blind and partially sighted.

Assistance should be made available for long or difficult transfer routes.

Provision of such a facility should be available at the main entrance.

All circulation areas should be free of obstructions, e.g. free standing signs, ashtrays, counters, vending machines, planters, seating and displays.

Floor surfaces should be kept clean and dry.

Carpets in public areas should not hinder the progress of a wheelchair. Edges, joints and threshold details should be designed so as not to cause tripping.

Rest places should be located at regular intervals, especially in large and long circulation areas. Audio and visual information, maps, telephones for assistance request should be available from here.

Water fountains, vending machines, etc., where possible, should be either recessed or an area on the floor in front of the facility should be clearly defined with colour and texture cuing.

Stairs or similar architectural elements should be closed off where they might cause hazards for seeing impaired.

Items like seating and planters can be used to prevent people walking into such obstacles.

7 Floors

CAUTION
WET
FLOOR

Problems

Floors can create problems of transfer for a number of people. In many stations and terminals, a terrazzo or ceramic tile material is often used in the construction of floors. This type of floor often provides a seamless and impervious surface that withstands heavy, continuous wear and is also easy to maintain. This particular flooring can be extremely slippery when wet and because of its general smoothness and regularity can be disorientating for the sight impaired. Many blind and partially sighted people rely on different texture sensations some of which they receive through their feet; suitable cues seldom exist in these buildings.

Older stations have old floors and when these were built the disabled traveller was not considered either in the building design or floor layout.

For disabled travellers, floor joints, and places where flooring material changes e.g. terrazzo meets carpet etc., are not detailed sufficiently so as not to be tripping hazards for the elderly, children, and the semi-ambulatory. For the wheelchair user, carpets can be a hazard and can affect wheeling. Thresholds, grates, mats, projecting seating, planters, free-standing signs are also some of the many obstacles found in terminal buildings.

Function

Horizontal divisions in a building which provide a smooth, level and unobstructed surface for the movement of people and personnel.

Standards

1. Floors and levels at different elevations on the same story are connected by ramps or elevators.

2. Design floor layout for proper sequencing of events and to provide non-conflicting traffic flows.

3. Vertical access to other floors shall be clearly visible from main traffic flow.

4. The surface is stable, firm and relatively slip resistant and easy to maintain. If carpeting is used, it is securely attached, has a firm underpad or no underpad and has a maximum pile height of 13 mm. Changes in floor surface such as carpet edges or expansion joints do not exceed 13 mm and are bevelled.

5. Minimum clearance between obstacles shall be 810 mm.

6. Provide non-glare lighting. Minimum 200 lux at floor level and 300 lux at focus and convergence points. Grade changes shall be lighted by a minimum of 300 lux.

7. Use appropriate signs to indicate handicapped route and access.

8. Information and signs shall be clear and permit decision on choice of direction while moving.

9. Functional furniture should serve additional needs, eg. ticket counters may also act as supports for semi-ambulatory.

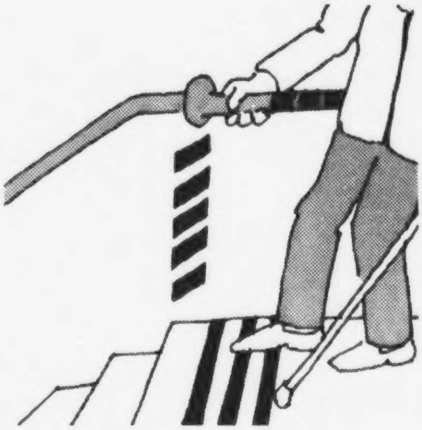
10. Provide waiting areas with seats, maximum 30 m from ticketing area or other such services.

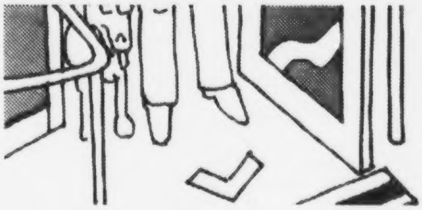
11. Use baffles to cut down confusing noise (transparent walls should be avoided).

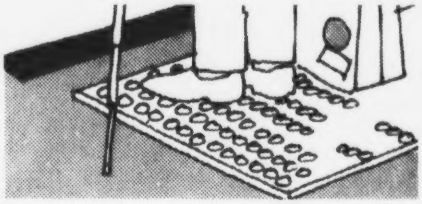
12. Avoid long walks, doors and unnecessary "aesthetic" level changes.

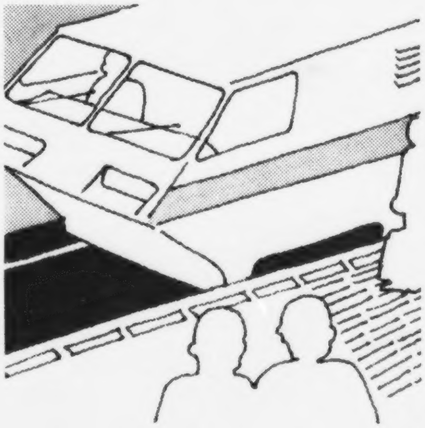
13. Design for different types of traffic: slow and fast moving.

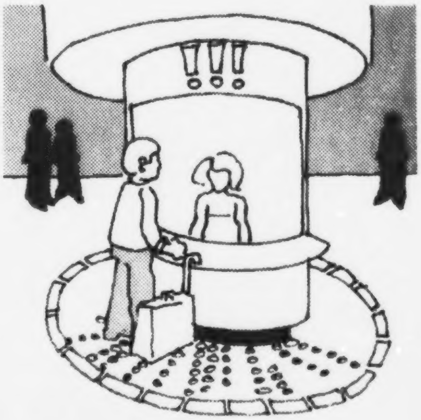
14. Avoid covering walls with mirrors.











Design Guidelines

Cuing for the blind should be three-way: on handrails, floors and walls.

Emergency communication and information should be provided at rest stops.

The surfaces of any floors within a terminal building must be non-slip. Unexpected variations in level must be avoided.

Loose, soft carpets and floor mats should be eliminated in public areas. When floors are wet adequate precaution must be taken so that travellers are warned of the impending danger. Small, free-standing signs warning of wet floors are often as much a hazard. Suitable warning devices should be used and should be identified by all travellers, especially the blind and partially sighted.

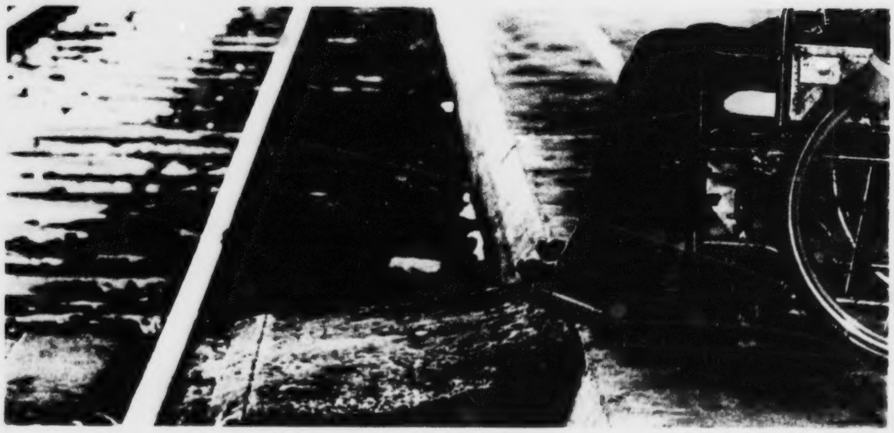
Floor texture cue should be used around objects and swing doors: these should also be used to show position of personnel at ticket and information counter. Texture can be in carpet or in floor or other means, e.g. rubber mat. Colour to be easily recognizable by most travellers, e.g. yellow or orange; differentiate texture pattern for different services.

Rail platform; colour tactile warning strips before platform edge, near stairs, elevators, escalators, ramps. Also indicate boarding points where possible, or within a general area on a platform.

Patterns should be selected in such a way as to assist in traction, especially on ramps.

Indicate visually and with colour an area where something is happening. Adequate lighting should be used over all cuing areas to emphasize colour and location.

8 Ramps



Problem

Although a good alternative to steps when space is not at a premium, they can end up being more dangerous if certain factors are not considered in their design. When a ramp is used for descending, the semi-ambulatory person who is either using crutches or cane, or is just having difficulty walking, a steep ramp can cause him to travel at a speed which he cannot cope with. Even the shallow ramp can be awkward to walk down if a handrail is not provided.

For the partially sighted and blind changes in floor level, unless forewarned, can cause a person to break stride and therefore trip.

The wheelchair user needs ramps for small level changes or to overcome steps, but not all wheelchair disabled have the strength to control a chair on an incline or to exert enough strength to propel the wheels when ascending a ramp. The ramp angle and length are often misunderstood factors and in many cases are another important item in the design which quickly can render such an element quite impractical for disabled travellers. As over stairs, lighting is an important factor and is not often provided over necessary level areas before, in between long ramps, and at the end in front of doors. Handrails are sometimes forgotten or not included.

Function

Ramps provide an alternative to steps for gradual level changes. A suitable angle of incline and the length of ramp, accompanied by a handrail, can make transfer between different levels comfortable and safe for all travellers. They are especially practical for wheeled vehicles to be either pushed, pulled or driven. The shallower the incline, the less effort required for both pedestrian and vehicle.

Standards

1. Where possible, changes of grade are avoided. Where grade changes cannot be avoided, walkways (slopes of less than 1:20) are used if practical. Ramps are to be as gradual as they can be within the space available.

2.

Max. Slope	Max. Length	Max. Height	Handrails
1:20	None	None	None
1:16	12 000 mm	750 mm	2 sides if over 2000 mm long
1:12	9 000 mm	750 mm	2 sides (as above)
1:10	1 500 mm	150 mm	2 sides
1:8	600 mm	75 mm	2 sides

3. Handrails shall extend at least 460 mm beyond top and bottom of ramp.

4. The minimum width is 920 mm except for two-way and where a ramp is the only access to an entrance, then width is 1500 mm.

5. Landings are provided the full width of the ramp at the following locations:

At the top and bottom of a ramp (1550 mm long).

At turns (1550 mm long).

At every 9000 mm of run, measuring minimum 1220 mm long.

Provide 50 mm high curbs along ramps.

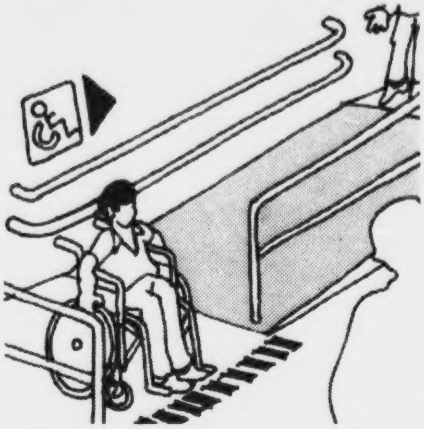
6. Ramps must sustain a minimum loading of 150 kg/m².

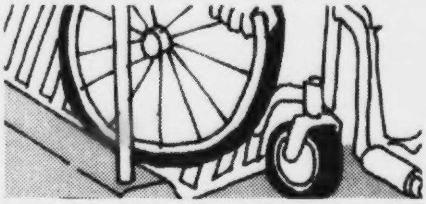
7. Ramps shall have a non-slip surface, be firm with no cross-slope.

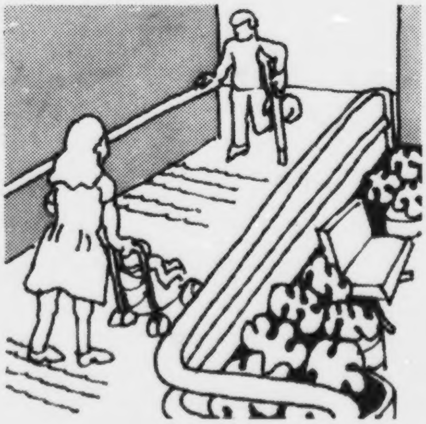
8. Standardize components for ramps and handrails, especially slopes, dimensions and cues for the blind throughout the site.

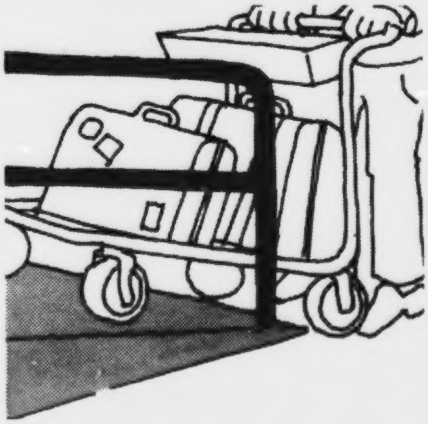
9. All ramps and landings shall be equipped so they can be illuminated to average levels of at least 50 lux at floor level and 300 lux for grade changes.

10. Design for different and passing traffic, e.g. ramps strong enough to serve as service ways for heavy baggage carts, transfer vehicles, as well as wheelchairs.









Design Guidelines

Ramps are alternatives to elevators only when they compliment stairs which have a vertical height of 1000 mm or less, e.g. properly designed ramps are generally too long for vertical distances which exceed 1000 mm. For heights under 1000 mm and severe space restrictions, ramps take precedence over stairs.

"Wheelchair only" ramps should be designed so that they do not lead too quickly into conflicting traffic flows, and they should have landings top and bottom. Ramps should be designed for all travellers who require a gradual and less strenuous method of changing levels compared to steps.

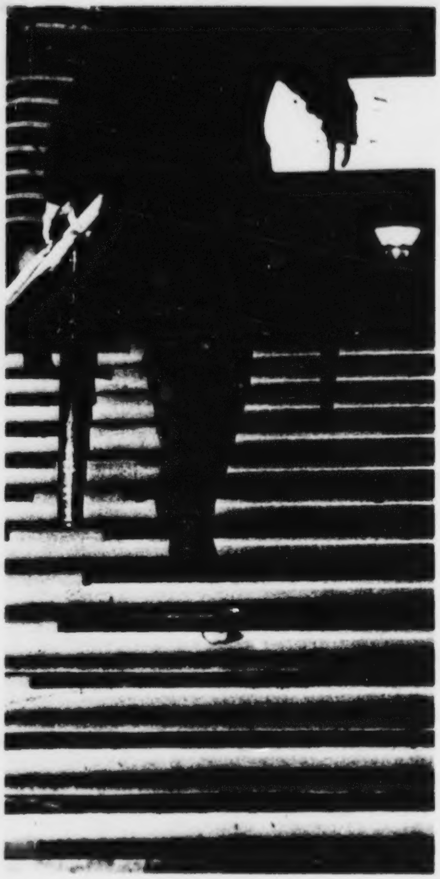
The ramp surface, slope and handrail design should consider wheelchair users, assisted and unassisted, and also others who might prefer to use a ramp, e.g. a mother pushing a pram, an elderly pulling baggage or other travellers using baggage carts.

On ramps, two handrail heights on each side should be provided for wheelchair users, children and walking adults. Top rail 810 mm to 860 mm from floor, lower rail 460 mm to 510 mm from floor.

A textured surface of brushed or ribbed concrete, vinyl or rubber treads, non-slip ceramic tiles, etc. should be provided as alternative surface finishes to ramps. The texture should be across the ramp to provide slight resistance for wheelchairs, especially when descending, and grip for prothesis wearers and crutch users when ascending.

Loose carpeting or mats must never be used on ramp surface.

9 Stairs



Problems

The design of stairways and steps can vary considerably, and can be different in the same building. This factor can be confusing to special needs travellers. Other things such as finish materials, step edge, colour and texture contrast, handrail position and shape, illumination and cuing generally, are important considerations which have to be made for disabled people.

Steps remain an obvious physical barrier for those travellers confined to wheelchairs and for some prothesis wearers, crutch and cane users, etc. Lower extremity amputees who have bending difficulties can find steps a barrier. Handrail position and type can make the difference for many upper extremity impaired and provide a good climbing aid or a hindrance to their progress.

Suitable cuing for partially sighted when they approach stairs is often non-existent. Handrails do not always extend beyond steps and onto landings to assist in direction finding and aiding stability.

Hazards exist for many when a flight of steps is not enclosed or provided with a protective barrier under. The blind can walk into the underside of such an architectural feature causing injury at head level.

A suitable alternative for special need travellers who cannot use steps is not always provided.

Function

Stairs are a means of physical transfer between floor levels for the average ambulatory passenger who is able to stand, balance and climb unassisted. Handrails or railings are a standard aid and safety element for those people requiring them.

Standards

1. Minimum width for two-way traffic shall be 1520 mm. Maximum run of each step shall be 250 mm and 300 mm. The rise between each step shall be between 125 mm and 195 mm.

2. Design step surface to be firm and non-slip.

3. Steps with nosings shall not be permitted.

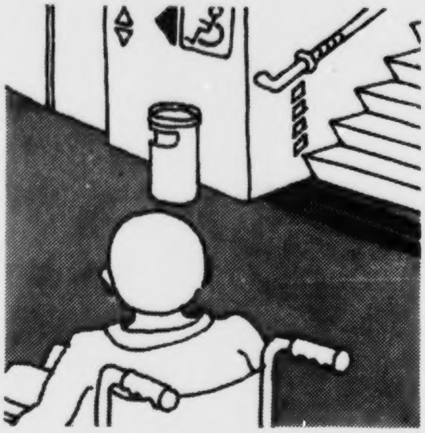
4. There shall be 25 mm of contrasting colour strip along the top edge of each step.

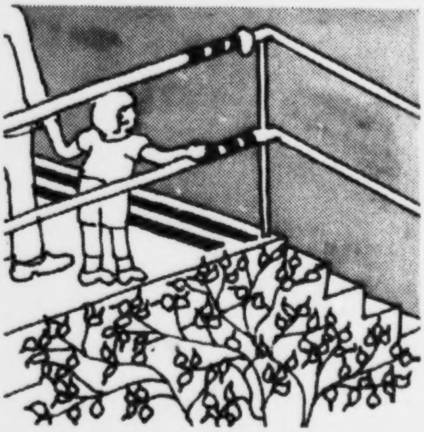
5. Non-skid tactile warning shall be provided on floors at the top and bottom of each flight and at landings; at the stairways directly in the path of travel that a person with impaired vision may take, with the exception of enclosed stair towers. This shall be detectable by walking upon, as being different from the surrounding floor surfaces, and shall extend for entire width of stairway starting one tread width from front edge of top riser back for a distance of 750 mm.

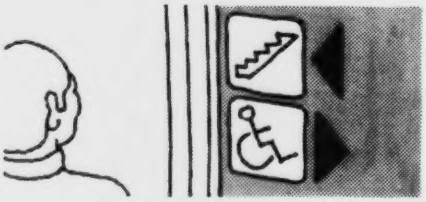
6. Stairs shall have a landing at least at each 3600 mm (2000 mm preferred) interval, measured vertically.

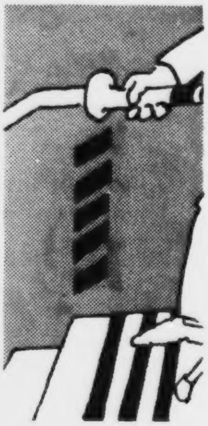
7. Handrails shall be provided on each side of a stairway and shall measure 900 mm vertically from top to front edge of step and above surface of landing floor; shall extend 300 mm beyond top and bottom risers and designed so that they do not become a hazard, i.e. ends should return smoothly to a wall, floor or posts. These shall be without a break up any one flight and, where possible, for full stairway, except where other paths of travel intercept such stairways. The end of each handrail shall be cued for blind with a standard texture warning.

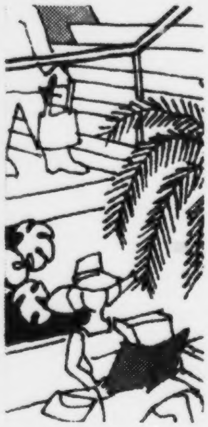
8. Provide minimum 50 lux illumination over steps and minimum 300 lux over landings.











Design Guidelines

Standardize all stairway and step dimensions on site. The position of stairs in new work should be logical, straightforward and located near alternative and/or accessible links to other floor levels.

Provide steps in addition to ramp above 1 m of grade change. Provide an elevator or moving ramp instead of a fixed ramp for rises of more than 1 m.

Provide level areas about 6 m long at top and bottom of steps and stairways. Handrail design should be comfortable for all: combination handrails (one above the other) accommodate different heights; average adult and children; see — *Handrails*.

Good, even illumination is necessary over all steps and stairways. Glare from artificial and natural daylight should be eliminated.

Clear signage (pictographs) showing where stairs are situated and where they lead should be positioned at main entrances and near stairs. Alternative routes and position of elevators and escalators should also be indicated.

Tactile cuing for the blind and partially sighted should be three-way; on the floor, on the wall and on the handrail.

New stairs should not be designed to descend or ascend to/from an inclined floor.

Open stairs should not permit passage directly under. Such furnishing items as seating, planters, etc. should be placed strategically to provide a natural barrier for the partially sighted.

10

Handrails

Problem

Handrails are important aids for most disabled travellers. They are often too deep or too wide to be grasped comfortably by many, especially those with arthritis, small hands or other difficulties in manipulating. The handrails are often out of reach for small children and some elderly. The shape, material and design of the handrail grasping surface is sometimes unsympathetic to hand shape and sensitivity. Handrails to stairs and ramps do not always continue beyond the end of a step or lead into the first step. They are often stopped abruptly, sometimes before the last step, such features are dangerous for the sight impaired and elderly traveller, and indeed others.

Function

A permanent aid which is fastened to one or both sides of a stairway, ramp, or other architectural element, to assist in ascending or descending. Can double as safety rails/guardrails on landings and also be used to help in the mobility of wheelchair users and as a standing/walking support for the semi-ambulatory.

Standards

1. Provide two height handrails on both sides of stairs and ramps: top rail 810 mm to 860 mm from floor, lower rail 460 mm to 510 mm from floor.

2. The rail itself should be smooth and 40 mm to 45 mm in diameter. There should be a minimum clearance between rail and wall of 40 mm.

3. Withstand a minimum pull of 1.33 kN, and should be able to support 113.4 kg without requiring wrist flex.

4. Ramps with a gradient steeper than 1:12 shall have two handrails spaced not less than 865 and not more than 1015 apart. See section on *Ramps* for further handrail standards.

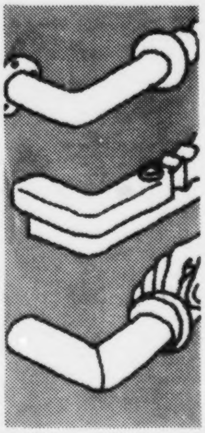
5. Handrails should extend at least 460 mm beyond the top and bottom of a ramp or stairs.

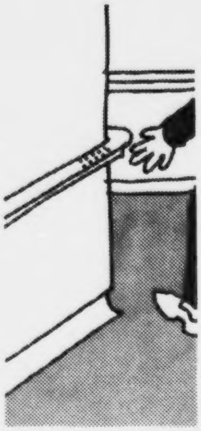
6. For very wide stairs, handrails can also be placed in the middle of the staircase.

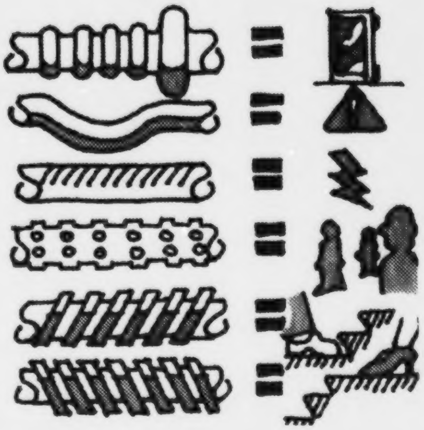
7. Handrails should be continuous across landings.

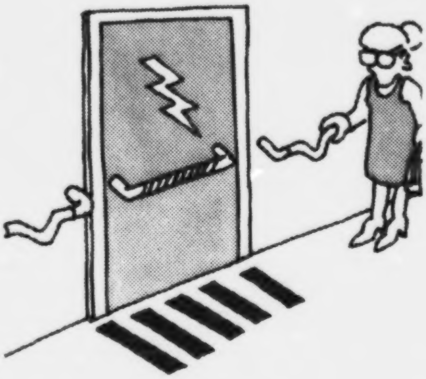
8. Textured strips applied to the handrails can act as cues for the blind.

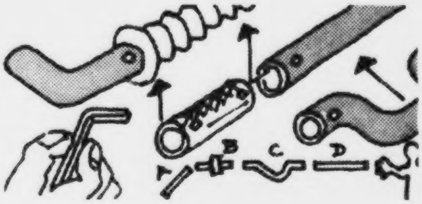
9. Handrails shall be provided with a textured surface, either as an integral part of the handrail, or by application of material such as vinyl textured strips (each strip of which is discernable by touch from remainder of handrail for length of 750 mm, preceding each change of direction and each grade change — going up as well as going down. Any handrail on exit ramp, stair or corridor that continues past or stops just before an exit door shall also have tactile signal as described).











Design Guidelines

Projecting ends should return smoothly to wall, floor or post.

It is essential to have handrails on both sides of staircases and ramps, possibly also on long connecting corridors without resting facilities.

Handrails should have a non-slip surface, the material should be comfortable to the touch and should be of a shape which is easy to grasp.

Tactile warnings as to beginning and end of steps, landings and doorways off landings should be incorporated as much as possible.

Warning symbols and handrail design and placement should be standardized on site.

Continuous horizontal handrails or grab rails should be used. These should be placed in such a way so as to be accessible to different disability groups and also travellers of different physical strength and age.

The termination of all handrails should be so designed so as not to be a hazard to sight impaired, cause potential injury and/or catch clothing of other unsuspecting travellers.

It is recommended that a combined handrail and guardrail, incorporating tactile and visual (coloured) warning elements be developed for use by all travellers. This system would be made up of standard elements which would be interchangeable. Such a system could be incorporated throughout all transport terminals.

11 Elevators

Problems

The problems associated with elevators, for use by the public, are typical in most transport terminals.

For the average traveller such things as: location, calling, elevator choice, and floor selection are usually not difficult matters.

For the disabled person, on the other hand, particularly the sight impaired, the location of this vertical link is seldom indicated clearly from either the building entrance or main circulation areas.

Once found, the number available, operating direction and levels served, position of elevator doors, and open/closing speed, are all questionable points for the blind, elderly and some temporary impaired travellers.

Gaps between car and floor, inadequate door widths and door speed, position of call and control buttons; all these items can make an elevator potentially hazardous and awkward to operate for the disabled in a wheelchair.

The call and control buttons are often difficult to use by the upper extremity amputee, arthritic elderly, short person or traveller carrying bags and hand luggage.

Function

To transport vertically a limited number of standing travellers within a terminal building. Call, direction and choice of floor is usually controlled by the user.

Standards

1. Minimum car size for most new construction as it accommodates a stretcher: 2030 mm by 1300 mm interior dimensions, 1065 mm minimum door opening (single panel), 1150 kg capacity.

2. Size convenient for wheelchair use: 1370 mm by 1300 mm or 1730 mm by 1300 mm, 810 mm door opening (single panel), 900 kg capacity.

3. Elevator lobby should be a minimum of 1500 mm by 1000 mm.

4. Shelter outdoor elevators.

5. Gap between car floor and lobby floor or any floor served shall be less than 30 mm at all final "halt" positions.

6. The level of illumination at the controls, platform, threshold and landing sill shall be at least 54 lux.

7. No more than two elevators in a row shall be provided serving same floor. If four are needed, place two opposite each other. This cuts down on walking to car. Provide one call button for four elevators.

8. Call buttons shall be located 1100 mm above lobby floor and have visual signal to register each call and when call is answered. Audible signals sound once for up direction and twice for down direction.

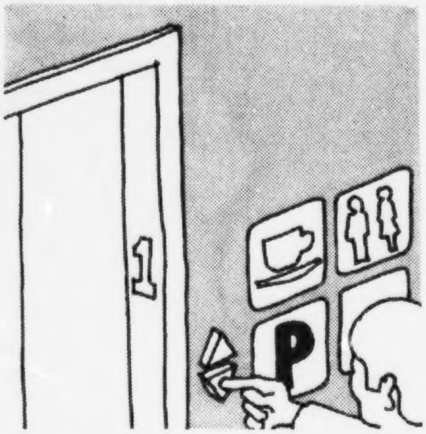
9. From time of indicating answer to call, to time door starts to close, period of one second for each 450 mm distance between call button and centre of door is suggested.

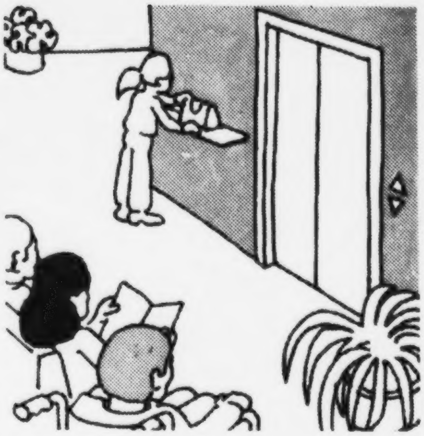
10. Reopening activators at 125 mm and 750 mm above on door jamb above lobby floor shall be provided so door automatically reopens without making contact with person or wheelchair.

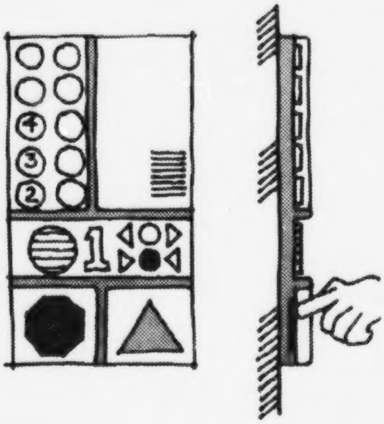
11. Floor designation shall be provided on both jambs 1400 mm to 1550 mm above floor in numbers at least 40 mm high raised at least 1 mm from background.

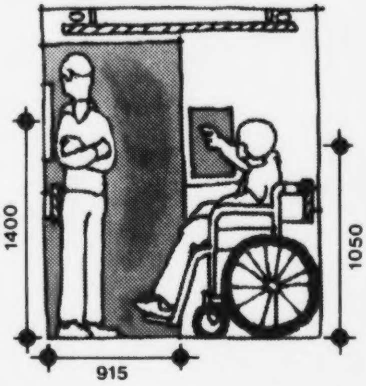
12. Car controls are located between 900 mm and 1400 mm from floor level. Buttons, minimum 20 mm in width, are identified by markings immediately to the left. The markings are at least 15 mm high, of a contrasting colour and raised at least 1 mm.

13. A car position indicator is provided to show position of elevator in hoistway.









Design Guidelines

Locate elevators, escalators and stairs in the same general area. Elevators should not be hidden or set apart to encourage use of escalator or stairs. (For many disabled persons, escalators are both a physical and psychological barrier.)

Provide elevator service, minimum one per floor, for wheelchair users at all indoor level changes exceeding one metre. Enclosed cabs are preferred for all level changes of one floor or more. Elevators should serve all integrated facilities, i.e. shopping, restaurant levels, indoor parking, etc.

Elevator lobbies are waiting areas and should be designed as such. Include seats, places for wheelchair, and shelves to rest parcels and luggage upon. Call button in lobby, should light up and emit audible signal when pressed. Directional arrows should be of a good size, at eye level and should light up in a distinguishing colour when indicating travel direction (the use of green and red should be avoided for colour blind).

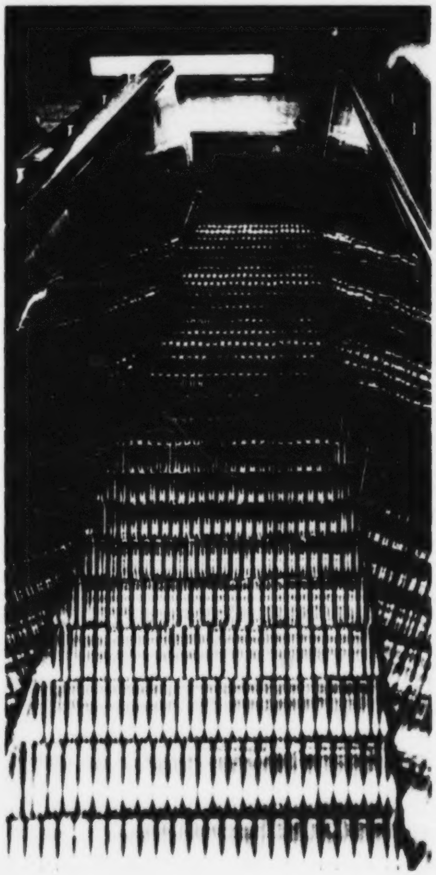
The audible directional signal, synchronized with light signal should be distinguishable from up and down.

Door closing time should be adjusted to allow for wheelchair user and others with slow gait to enter without obstructing doors. Reopening activator should be installed on all elevator doors.

Control panels inside cab, should be designed to be easily operated by the blind, upper extremity impaired, those with cerebral palsy, and certain mentally retarded travellers.

Preferred maximum height of control buttons in public buildings is 1600 mm. For general purpose a mean height of 1400 mm for controls is suggested. Controls to be operated independently by chair bound disabled people must not be higher than 1300 mm above floor level with a mean height being 1050 mm.

12 Escalators Moving Ramps Moving Walkways



Problems

As with other transfer elements, such as stairs and elevators, finding these within a terminal building is sometimes difficult for travellers.

For those travellers with special needs, adequate visual and audible information showing where to find these facilities is not always provided at the beginning of transfer procedure or near the element itself. There is seldom adequate cuing information for the blind and partially sighted.

Escalators are not accessible to some special need travellers and they are not warned of the dangers in using them. Some of these travellers being semi-ambulatory and upper extremity impaired disabled.

For the blind, partially sighted and some elderly, information and warning is not adequate when approaching these moving devices. The position of the handrail, the point where the floor ends and where the moving element begins and an indication of speed and direction is not provided. Visual and audible warning signals and emergency stop buttons are rarely found on these passenger conveying devices.

Function

To transport, at an incline or horizontally, by mechanical means using a continuous moving, non-slip base for feet and moving handrail for support.

Escalators, ramps, and walkways come in various lengths and widths and provide an alternative to climbing steps and walking long distances within terminal buildings.

Moving ramps and walkways assist most special needs travellers. Escalators tend to be quite narrow, but moving ramps and walkways allow room for passing and are often wide enough to accommodate suitcases, baggage carts, wheelchairs, seeing eye dogs, etc.

Standards

1. Width of all escalators shall be between 810 mm and 950 mm.

2. Slope for escalators should be no more than 30%.

3. Speed of escalator should be between 38 m to 44 m per second.

4. Bottom and top edges of escalator steps shall be highlighted with a contrasting colour.

5. Extend escalator handrail horizontally for 460 mm before and after a grade change.

6. Running headroom on the incline of an escalator shall not be less than 2130 mm vertically.

7. Use fine-comb teeth on escalator to prevent heels and crutches from being caught.

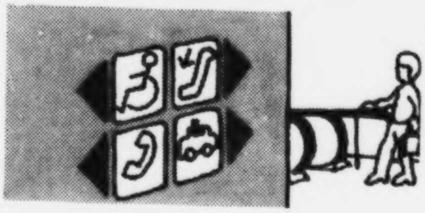
8. Moving steps or mats shall be illuminated at least 50 lux at floor level, and 300 lux at grade change.

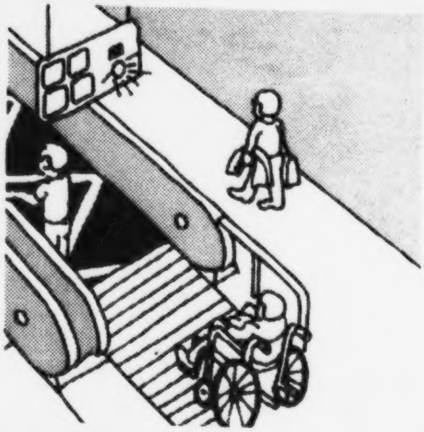
9. Wherever possible alternative facilities should be available for people with limited walking ability.

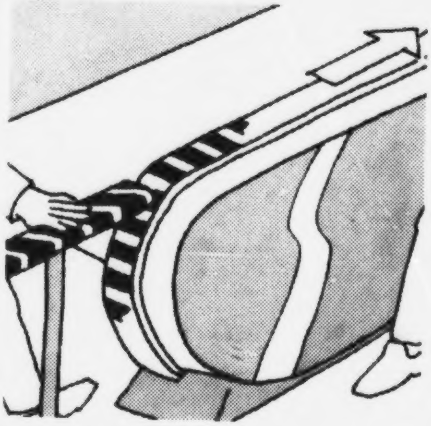
10. Two handrails moving at same speed as the escalator shall be located at a height of 840 mm from the edge of the steps or the ramp. Handrails shall have a contrasting colour.

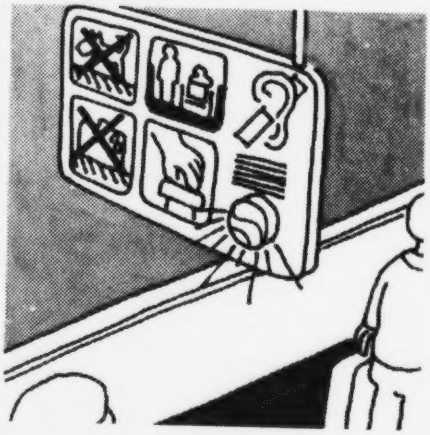
11. Moving ramps and walkways open to use of wheelchairs should have a longitudinal slope of no more than 13%.

12. There are no special requirements for wheelchair users on the width, length and construction of moving ramps and walkways.









Design Guidelines

The position, within the building, of these mechanical transfer elements should be made known from the entrance of the terminal or station.

It is important that these elements are situated together with such items as stairs and elevators. An alternative should always be available for those travellers who might find any mechanical or fixed element either physically impossible and/or psychologically unnerving to use.

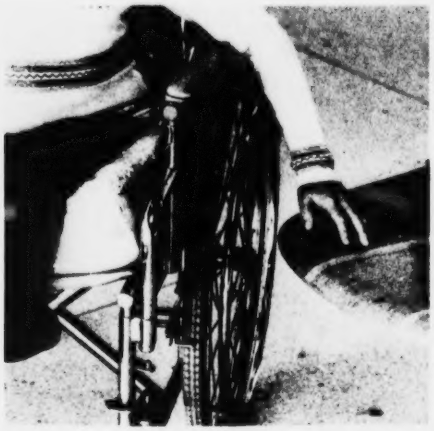
Suitable visual and audible signals should be provided at the entrance to each moving element designed for the conveyance of standing passengers. A distinct warning light and signal should be activated by the traveller when in vicinity of a moving step, mat or ramp. To accompany these signals a lead-in handrail, in a light colour or lit internally should be provided. One on each side would accommodate right and left-handed travellers.

The internal width of the conveyance should always be generous enough so as to discourage crowding and pushing at the entrance. At this point a suitable tactile and colour contrast cue should be provided where the floor edge meets the moving step or mat. Vertical sides and surfaces leading into moving handrails should be treated similarly.

As an example, the moving mat and handrail which is usually made of a uniform black rubber material, should contrast dramatically with all things stationary at the beginning and end of the conveyance. A yellow coloured edge 25 mm wide, running length of step or floor before mat is not sufficient for the partially sighted and others like children who might be distracted while stepping.

All moving surfaces should be painted a combination of two high contrast colours e.g. white and black, yellow and black. The movement of the surface should be emphasized by a diagonal, zig zag or broken line pattern.

13 Seating



Problems

In many instances where seating is provided it is often arranged so as not to give adequate space for a wheelchair user to rest. When placed in front of or at the end of a seating row a wheelchair can obstruct the circulation space in a waiting lounge. The provison of only one area for wheelchair users to sit together, providing minimal accessibility, should not be encouraged as it discriminates against the disabled who do not have the same choice of seating position offered the able-bodied. It may also prevent a disabled person from sitting with friends or family.

People in wheelchairs may be unable to draw up close to tables because the table is too low. Fixed seating can also prevent wheelchair access.

It is difficult for people with bending, balance or stamina problems to sit or rise from seats which do not have armrests provided. They are a stability aid for some travellers when sitting down or getting up.

Wider seats with clear leg space are needed throughout terminals for those using braces and crutches.

Seating in waiting lounges, restaurants and other public areas is not generally suitable for ambulant disabled people, being too low, giving poor support and often lacking armrests. Seat and backrest design angles are largely inadequate for many users.

Function

To provide comfortable, physical support for a variety of people, who vary in height, weight, age and physical characteristic. Seating may be of the basic bench type, without backrest, or complete with back and armrests. Furniture might accommodate, more than one person or be suitable for individuals only. Materials used to manufacture chairs vary considerably: wood, metal, plastic or a combination of these materials can go into the structure. Padding densities, upholstery fabric and the dimensions of public seating are also variable.

Standards

1. Choose built-in or fixed furniture and install according to 90° or parallel with walls to aid the seeing impaired. A majority of seats shall face information boards, video displays, concourses, etc.

2. Rest area furniture shall be strong enough to support a person sitting with space for hand baggage and also stable enough to be used for support when standing.

3. The seats shall have a minimum depth of 330 mm and a maximum depth of 406 mm. Seats with a depth of 457 mm give fuller thigh support for large people. A seat width of less than 406 mm does not fully support buttocks of large male or female.

4. A lounge chair for the average male should have the following dimensions: front edge to seat reference point (SRP) 445 mm, height of back from SRP 584 mm, upholstery height (seat front edge) from floor 414 mm, horizontal line through SRP from floor 302 mm, angle of horizontal line through SRP to angle of seat 15°, backrest to seat angle most relaxing 103°, angle of backrest to vertical line drawn through SRP 28°.

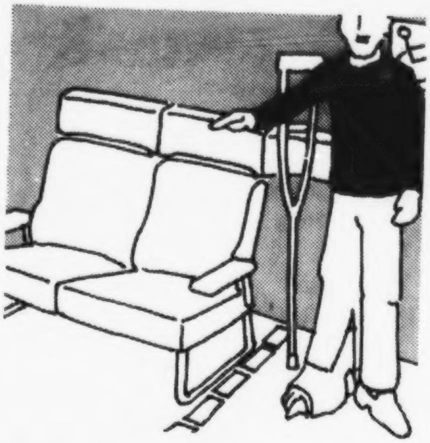
5. To prevent "jacknifing" keep knee angles and hip angles greater than 90°. High seat pressure at seat front edge slows down blood circulation in the legs, seat edges can be disturbing if felt. Avoid deep soft cushions or padding material. Avoid abrupt changes in contour of seat back. Padding to seat back should maintain lumbar cavity to depth of 15 to 25 mm.

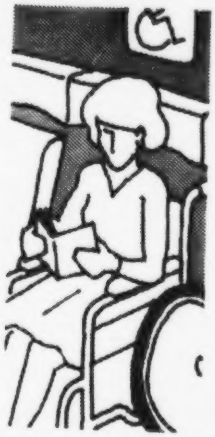
6. All seating shall have strong armrests to aid in sitting down and standing up.

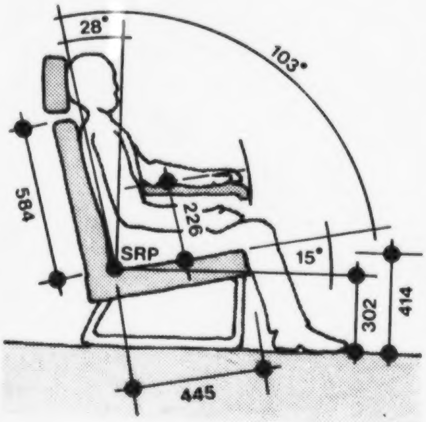
7. Armrests may be horizontal or parallel to seat surface. Pad firmly for elbow support. Armrests aid in rising out of the chair. Minimum width between armrests shall be 525 mm. These shall be 226 mm from seat surface to top of armrest.

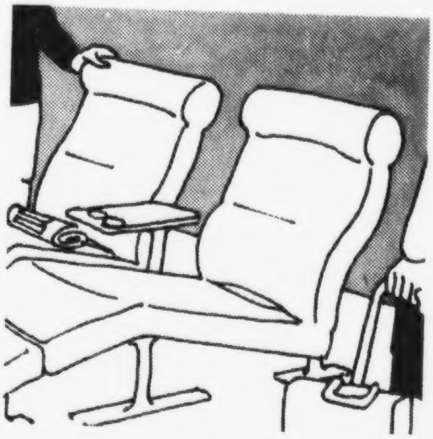
8. A 610 mm wide seat is required for those wearing lower limb protheses. Wide seats and wheelchair spaces can be used to stagger seating for good sight lines in front of information boards, etc.

9. In smoking areas, ashtrays shall be located so that they may be used from a seated position.









Design Guidelines

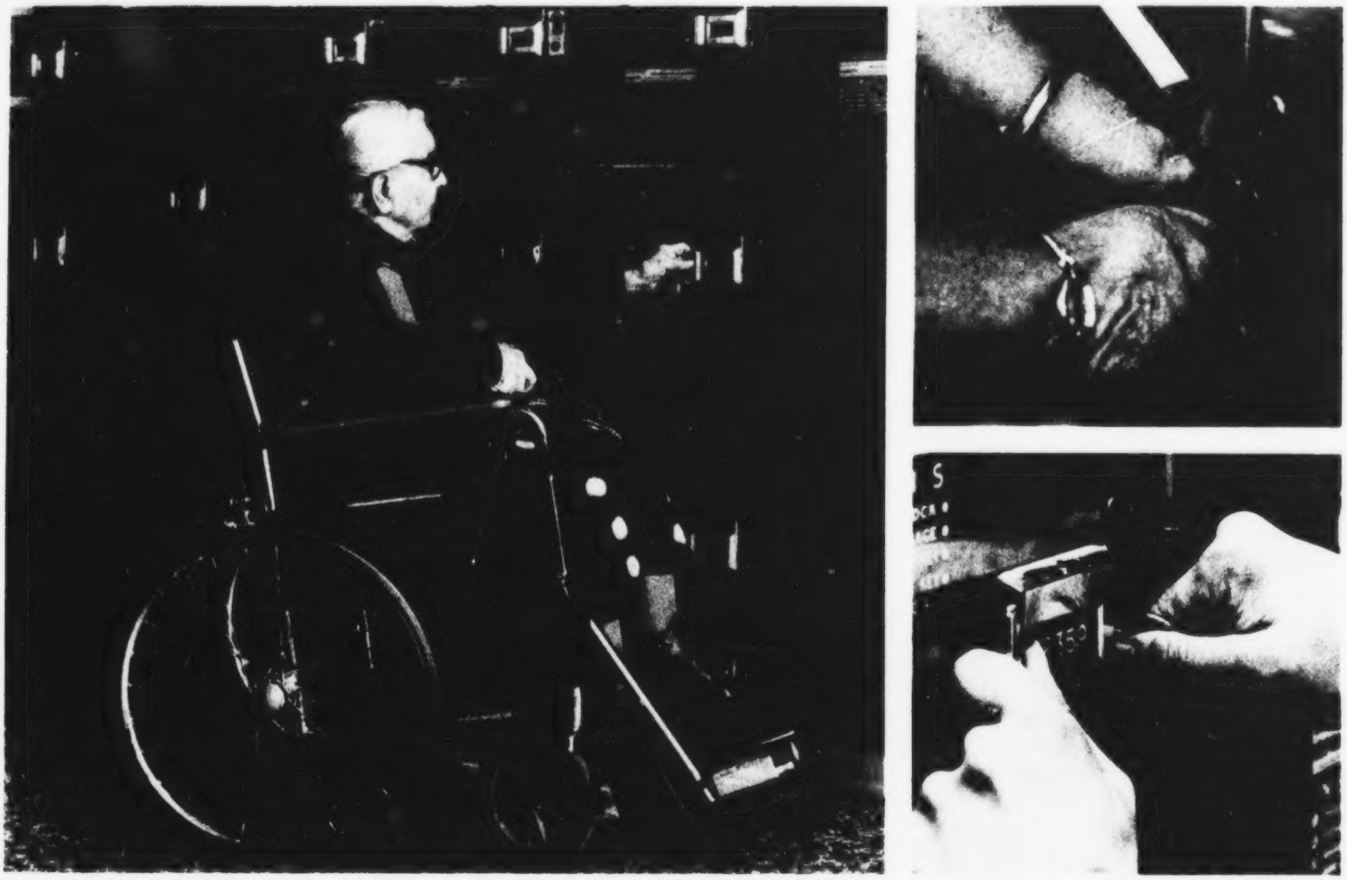
Provide seating for different types of postural requirements: conventional height seating for average adults; low seating for short people and children; high seating for tall people and prosthesis wearers, some elderly and crutch users; wide or bench type seating (with back support) for large adult; padded backrest for leaning, standing adult (brace wearer, leg cast, or just waiting in line, etc.); adequate space for wheelchair users.

Wheelchair user requires a space approximately 760 mm wide by 1220 mm deep when providing seating clearances.

All travellers in air terminals will require at some time, through flight delay or cancellation, a place to rest comfortably in a position other than sitting upright, with feet on the ground. A number of fixed reclined seats with a leg/foot rest should be provided for these passengers. Much room in conventional seating can be taken up and upholstery materials soiled because of the need for a passenger to put up his feet and to prepare for the ordeal of a long wait. All arm rests should extend at least to the front of a seat and be of a height and width suitable to assist elderly in rising and sitting.

When long corridors and walkways are found in a terminal building, seating and waiting spaces for wheelchairs should be provided at approximately 30 m intervals.

14 Lockers



Problems

The location of such pre-pay lockers is not always evident to sight impaired travellers and others.

Certain lockers are not accessible to some travellers with physical disabilities. Wheelchair bound travellers often require assistance in placing and retrieving baggage from high lockers. Those people with upper extremity impairments have similar difficulties when conveying bags into lockers and also depositing coins and retrieving key.

Holding door open; depositing coin; holding, pulling and retrieving key are all necessary simultaneous actions which many special needs persons find difficult or impossible. These actions can also prove extremely uncomfortable and even painful for some.

Coin changing machines are not always found in the vicinity of such lockers and if they do exist nearby, are not easily noticed or coordinated to go with locker systems.

Function

Facility provided for the storage of hand luggage and small bags for a limited period of time. Deposit of payment and operation of receptacle usually performed by traveller unassisted. Normally two-handed operation. Key is used for securing items stored and for identification purposes. When key is inserted to open locker storage time is terminated, a further deposit renews this period.

Standards

1. Design of lockers should be hazard-free, e.g. no sharp edges to catch clothing or protrusions to trip over.

2. Choose built-in or fixed locker systems and orient according to a 90° plan with walls, circulation routes, etc. to aid blind.

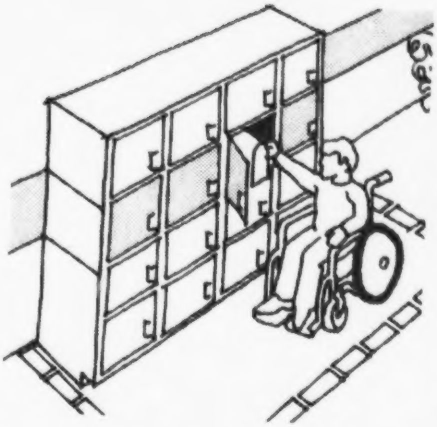
3. Lockers should be designed to provide alternate sizes at various heights.

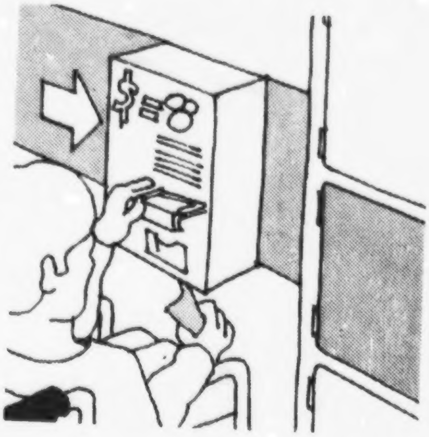
4. In each grouping of lockers at least 25% of all lockers will be of the following sizes: 305 mm by 305 mm by 915 mm; 750 mm by 305 mm × 915 mm; and 610 mm by 455 mm by 915 mm. There shall be at least three lockers of each of the above sizes for every twelve lockers and at least two of these, of each size, shall be located at a height less than 1220 mm.

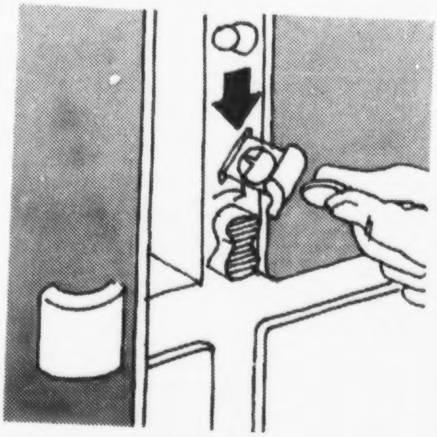
5. If the cost is the same for all lockers, or if not all sizes can be offered, then only the two larger sizes can be offered.

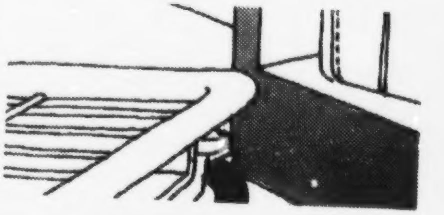
6. A bill-changing service shall be provided either at the ticket counter or through a coin-changing machine adjacent to these facilities.

7. Lockers should be illuminated to a minimum level of 200 lux (300 lux preferred).









Design Guidelines

The position of lockers should be shown from the main entrance of a station or terminal. Appropriate pictograph, colour and tactile cues should be used to give direction and location of lockers.

Locker areas should be provided with suitable floor cues in a texture and colour to show partially sighted the position. Colour on lockers generally and colour on those that are accessible for the disabled travellers should be bold so as to be distinguished by partially sighted and other special need travellers. The money changing machine should be colour coded similarly and located near the locker system.

Instructions should be legible, in pictographs and braille where possible. They should be positioned at a height as described for vending machines and telephones. A tactile coding should be provided for key/locker identification. A bright colour and easy grip should be provided for the key. Door closing, coin deposit and key retrieval should require only one-hand operation. Horizontal push-coin receptacle should be considered for all travellers, especially those with manual dexterity difficulties.

15 Washrooms

Special Toilet Rooms
Toilet Stalls
Toilets
Lavatory Fixtures
Related Facilities

Problems

If a special toilet room exists, it is not always identified from the main entrance of a building. Doors to the room are often of a type that are not easily opened by either a person in a wheelchair, semi-ambulatory, or upper extremity impaired. Provision is not always made for an attendant nor is there always an emergency call button within the toilet room. A grab rail, lavatory and mirror are not always standard. Sometimes only a toilet fixture is installed.

Toilet stalls, designed for the ambulant and non-ambulant disabled, are usually provided where special toilet rooms are not found. The doors of such stalls are often not marked with the official symbol of wheelchair access thus they are sometimes occupied by the able-bodied. Inward opening doors with difficult locks and non-existent pull handles can make using some facilities extremely frustrating and in some instances impossible for the special needs traveller.

Although it can be found that an accessible toilet stall exists within a common washroom, the main door to the washroom can be a hindrance to either the wheelchair user, the upper extremity impaired, semi-ambulatory, elderly and others.

Facility for the changing of diapers or warming a baby's bottle seldom exists within a washroom area.

Function

The toilet room is an enclosed accessible space where the traveller, who is disabled, can fulfill intimate sanitary needs. Facilities, within this space should be suitable to all people who have a disability.

When the above special room is not provided, constituent features of such a room shall be located within an accessible public washroom.

Standards

Where facilities are required for use by special needs travellers, e.g. special toilet rooms and/or toilet stalls, toilet fixtures, lavatories and auxiliary equipment, then at least one of these shall be installed in conformance with the following standards:

1. Inside dimensions of toilet rooms shall be at least 1680 mm × 1680 mm. Toilet stalls shall be minimum 1400 mm wide by 1500 mm deep.

2. Minimum area, in toilet rooms, required for manoeuvering wheelchair in front of, to one side of toilet and in front of lavatory, shall be 762 mm × 1067 mm.

3. Door to washroom, special toilet room and stall shall be identified for use by special needs travellers. Minimum clear door opening should be 813 mm, swing out when possible and be capable of being locked from inside. A pull handle shall be mounted near hinge side of door.

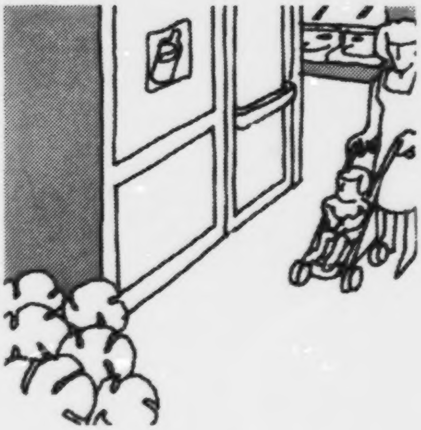
4. Minimum distance to centre line of toilet from wall or other fixture shall be 381 mm. In a stall, no less than 914 mm shall be provided from centre line of toilet fixture to adjacent side wall.

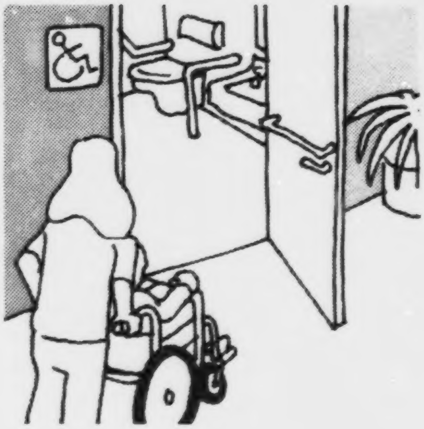
5. Seat of a toilet fixture shall not exceed 457 mm above floor and seats with spring action shall not be used. A back support shall be provided for toilets with concealed cisterns. This may be of fixed type or seat lid and should be secured or rest approximately back 5° from vertical.

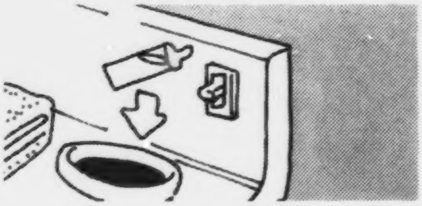
6. Wall or floor mounted toilet fixtures, with receding bases, are desireable. Flushing controls shall be hand operated, of lever type and easily accessible to wheelchair users.

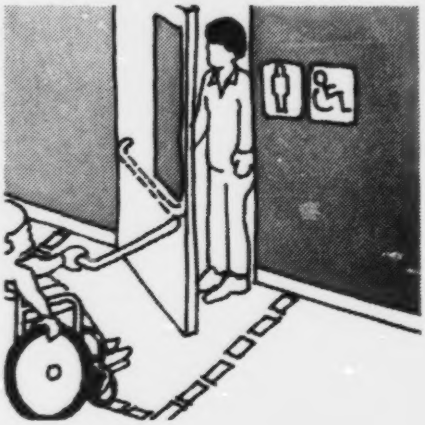
7. Grab bars shall have a diameter between 45 mm and 50 mm. They should be mounted at one side of the toilet fixture approximately 400 mm from the centre line of the fixture. The space between the bar and the wall shall be approximately 45 mm.

8. Distance from the floor to the underside of the grab bar shall be 750 mm, and from rear wall or cistern shall be 300 mm. They may vary in length and be straight or bent. Lengths for horizontal bars are 600 mm, 900 mm and 1100 mm, with bend end angles of 120° and 90°. Those bars with 90° bend should extend 350 mm in front of fixture before vertical bend.









Design Guidelines

A counter or table should be provided for changing infants' diapers in one men's and one women's washroom.

A private room should be provided in one women's washroom for breast feeding. Diaper and other waste disposal facilities should be made available at each diaper changing facility.

A fixed bottle warmer should be provided at each changing facility.

Special toilet rooms for chair bound disabled people should be usable by passengers of either sex, allowing a wife to help her handicapped husband or vice versa.

Doors should open outward where possible.

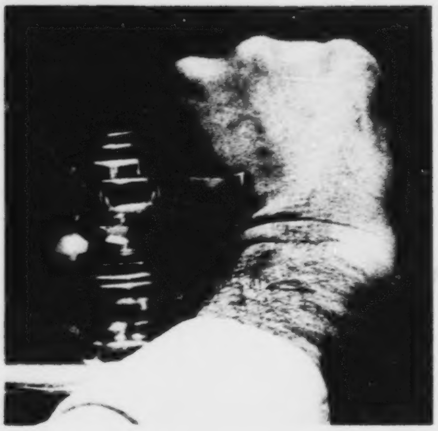
In the case of small airports with only one available toilet this should be equipped in such a way that it is also accessible for handicapped passengers. The toilets for the special needs travellers must be provided on the landside and on the airside, near waiting areas, of a passenger terminal.

Main doors to washrooms should be provided with a vertical glass panel on side opposite hinging to provide visual warning to those leaving or entering lobby. Wheelchair users, semi-ambulatory, short people and children should see and be seen when using door.

For main washroom door, if hinged to open inwards, a horizontal opening aid, which doubles as a grab rail, should be incorporated in addition to glass panel. A self-closing device which keeps door open 90° for a period of five seconds before closing, should be used on such washroom doors.

16

Drinking Fountains



Problem

The location of such drinking fountains is not always made obvious in many terminals. They are sometimes to be found in places where a person using the fountain, projects into a circulation area and becomes an obstruction for other travellers and/or mobile equipment.

Some fountains positioned to be used by the disabled were found to be fixed at different heights in the same terminal building. A standard and suitable height or fountain type has not been specified throughout all terminals.

A type of projecting fountain, with clearance below, prevented both the knees and wheelchair to fit under (and allow simultaneous pressing of water control) thus creating a design paradox. In addition, the projection was so considerable as to create a hazard for the blind using cane technique. The cane passed under the unit and then would not be detected in time to be avoided. The approach from the front, was extremely hazardous and the position of controls and spout made the use of only one hand and drinking from one side possible.

A particular hand had to function and the head needed to twist in one direction. There was no alternative way of approaching the unit or drinking from it.

Function

A manually operated fixture used to provide a controlled flow of water for the hygienic refreshment of travellers and personnel. Used by one person at a time, also used to assist in the taking of prescribed medecines.

Standards

1. Is of a wall mounted type.

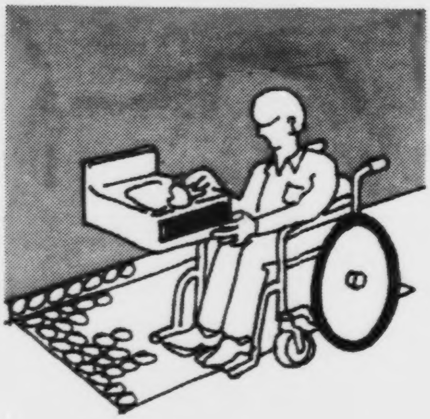
2. Where the fountain is located in an alcove, shall be available from the front by the wheelchair user and control and drinking shall be from either side.

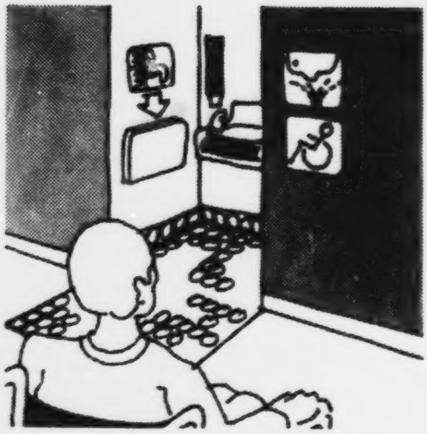
3. Is not to be located so as to pose an undetectable hazard to persons with visual impairments.

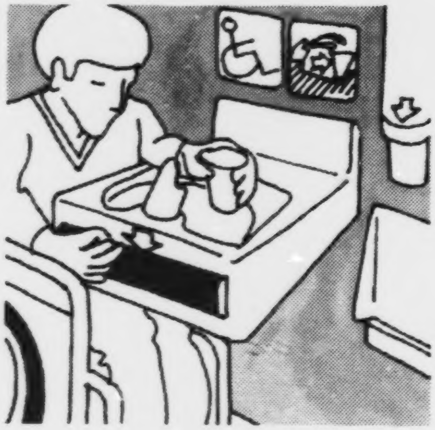
4. Has a spout opening between 750 mm and 900 mm above the floor. If the spout outlet must be above 900 mm, an alternate spigot within 900 mm of the floor or a spout which allows the insertion of a cup together with cup dispenser, next to the unit, is to be provided.

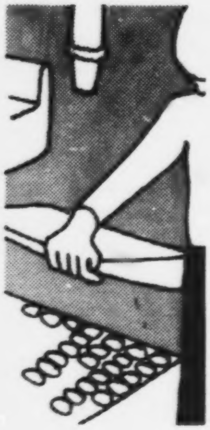
5. Has the trajectory of the water flow parallel or nearly paralled to the front of the unit and the spout located at the front.

6. Has lever or push bar controls mounted either at the front or on both sides, operable by force not exceeding 13 N. The controls are operable by hand without the need for grasping, pinching, twisting or hand pressing of small button.









Design Guidelines

The location of all fountains should initially be made obvious through clear signage and cues. This should be standard in all terminals i.e. when a male or female washroom is provided there should also be one fountain which is truly accessible for a wheelchair user and other disabled, and one for the average person.

They should be positioned so as not to be either a hazard for those people in the circulation area nor should the person using the fountain be in an obstructing position when drinking from the fountain.

The designs of such accessible fountains should be considered very closely before specification. A fountain designed for the wheelchair user is not necessarily suitable for other disabled persons (e.g. those with cerebral palsy, arthritis or lower arm amputations).

Controls and direction of water stream should be such that operation can be done with either right or left hand and the fountain can be used from at least two sides (i.e. head can bend to the right or to the left).

The spout design should be such that it accepts paper cups.

Drinking fountains for special needs travellers should be positioned in one of two ways: surface mounted type which projects from wall but is approached and operated from either left or right hand side, not from front so as to obstruct circulation routes; the other type could be recessed, but approached and operated from the front with alcove width being minimum 915 mm. Both would be positioned suitably for wheelchair users and other special needs travellers. Such things as an area cue on the floor, controls operated by left or right hand, two-position spout and paper cup dispenser and waste receptacle should be included in the designs.

17

Vending Machines
Waste Receptacles

50¢
stamps
timbres
NOTE NOTA

$1 BILL
CHANGER
2.25
50
stamps
timbres

Problems

Vending machines which dispense snacks, food, hot and cold beverages, and cigarettes are often of a standard design which can be found throughout transport terminals. As with telephones, the operation of these machines, particularly manipulation of coins into the slots provided, can prove difficult to impossible for certain special needs travellers. Putting coins into a slot, if there is no guide to aid a person who lacks incoordination or finger manipulation ability, can be an embarassing and awkward experience.

Attempts to pick up change from a vending machine, especially when only one or two fingers can be inserted, or insufficient space to bend fingers is provided, often end up being unsuccessful or result with coins falling onto the floor.

Coin deposit, item selection and retrieval can be difficult for many. Adequate clearance is not usually provided around a beverage so it can be picked up with two hands if necessary. Flaps and shutters can get in the way, as they often require a hand to hold them up. Controls have not been tested for use by people with manipulation/dexterity problems. Machines, their contents and operation, are not suitably marked for identification by blind and partially sighted. Wall mounted dispensers can be awkward or impossible to reach for the wheelchair user or short person. These are seldomly positioned at a standard, comfortable height, and those which happen to project more than 100 mm can become an obstacle for seeing impaired when located in circulation areas.

Function

To dispense items automatically for general consumption on deposit of coins of different amounts. Such things as snacks, beverages, newspapers, insurance, stamps, cigarettes, personal hygiene aids, etc. can be vended.

Standards

1. Coin slots and other operable parts should be between 1015 mm and 1400 mm above finished floor level. Minimum height of opening in a vending machine for retrieving items shall be 610 mm above the finished floor for the disabled and elderly.

2. Wall mounted vending machines shall be accessible and fixed to the wall in such a manner that all controls fall between the dimensions given.

3. Controls shall not require tight grasping or pinching to activate. Force required shall be as little as possible and shall not exceed 13 N. Pushbutton, solenoid type controls are preferred over pull type mechanisms. Click stop controls are preferred where a range of operations are performed by a single control device.

4. Controls, dispensers and receptacles shall not require the use of two hands, or simultaneous movements by one hand, to operate.

5. Slots shall be designed to allow for the insertion of coins, tickets or cards in an imprecise manner.

6. There shall be a minimum illumination of 200 lux (300 lux preferred) at all controls, dispensers and receptacles.

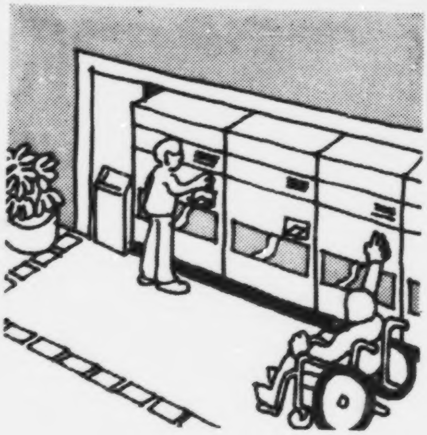
7. Provide sufficient space for manoeuvering wheelchairs in front of all vending machines.

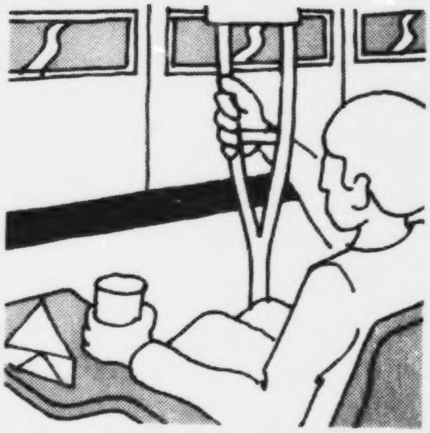
8. Waste receptacles shall be firmly secured, so that they cannot be tripped over accidentally either by the blind or by the semi-ambulatory using them for support.

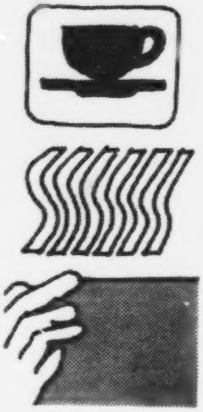
9. Foot-operated ground level receptacles shall not be used.

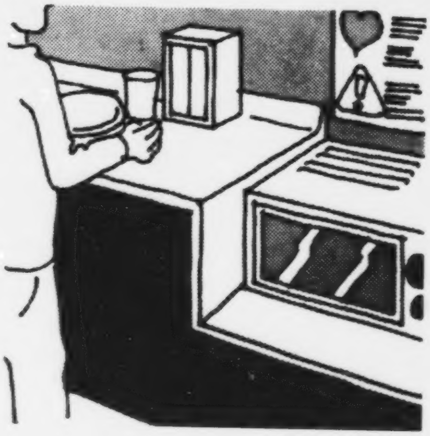
10. Height of receptacles shall be between 900 mm and 1000 mm.

11. Waste receptacles shall be operable by one hand only and have no sharp edges or corners.









Design Guidelines

Good signage, identifying colours and tactile cuing on floor should indicate where vending machines are located.

As much as possible they should be grouped in the fewest areas to assist all travellers in locating and using such services and also to facilitate in stocking and maintenance.

Vending machines of all kinds should carry their written instructions at a minimum height of 1200 mm above floor. These should be clearly printed, possibly in raised letters to meet the requirements of passengers with impaired vision. Pictographs should be used wherever possible. Contents of machine should be represented in a tactile manner and a standard system should be developed for use throughout public transport terminals. Textured plastic laminate panels could be used to distinguish machine contents. These patterns should be standardized throughout all terminals.

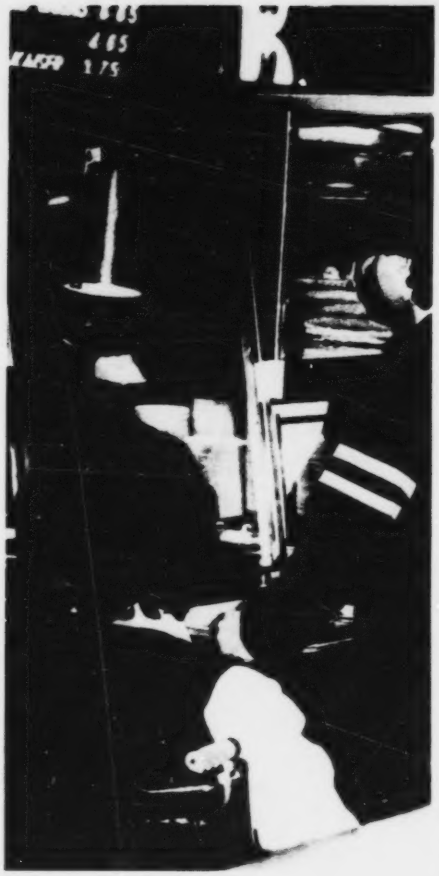
A counter surface, at least part being accessible by the wheelchair user, should be situated near food and beverage vending machines. Seating should also be provided, which might include small built-in trays, possibly one at each end of a seating row, to hold drinks and to assist in opening sandwich packs, etc.

Snacks, sandwiches, etc. should be wrapped in such a way that opening is not difficult for those people with arthritis and other manipulative disabilities. If microwave ovens are used, then adequate signage should be posted to warn those people with heart pacemakers, who might be in the vicinity.

Layout of machines, counter, waste receptacles and seating should be similar in all food dispensing areas. No machine should project into a circulation area and become an obstruction to other travellers.

18

Snack Bars
Cafeterias
Restaurants



Problems

Locating food service areas, entrances and food service lines is a problem for all travellers and good clear signage, giving direction and showing the place, is not always used. For the sight impaired, audible and tactile cues are necessary when these travellers are to be informed. In cafeterias certain things such as finding and manipulating trays and cutlery and selecting food are areas of necessary improvement for those with poor or no sight.

For the wheelchair user, aisles that are too narrow, food displays which are too high and trays that are often low and beyond reach can discourage and restrict many travellers in wheelchairs from using these facilities. Handling hot plates and liquids for all special need travellers, especially those who are sight impaired or with manipulative problems, can be a difficult and hazardous procedure.

Paying, finding a table and seat can also be extremely awkward for many travellers.

Seating for those with protheses or crutches and a suitable space for wheelchair users is seldom provided, also a point where seeing eye dog and/or other aids can be left is often neglected in the design of eating places.

Lighting, especially near wall menus and over tables in restaurants, can confuse the special need patrons unless the intensity is controlled to suit their needs.

Function

A fixed facility for providing travellers with food and beverages. Can be either self-serve or with service provided by personnel. Refreshments might be consumed in either a standing or sitting position or taken away to be eaten elsewhere.

Standards

1. Cafeteria lines and restaurant doorways should have a minimum of 915 mm clear width to allow for the passage of wheelchairs and clearance of users' elbows when propelling a wheelchair.

2. A variety of food items shall be displayed and made available within easy reach of a person in a wheelchair and short people. Side reach for a person in a wheelchair, 600 mm maximum, 610 mm over counter, 1150-1200 mm from floor, 300 by 1400 mm high, vertical side reach and 510 by 1200 mm high, horizontal forward reach over a table.

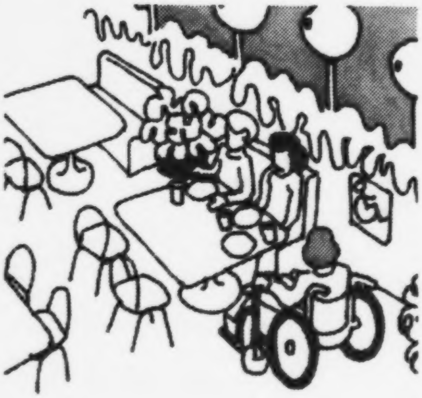
3. The height of counters for conveying trays shall be 915 mm maximum and the permitted reach to any dispenser shall be within the limitations of wheelchair users unless employees are behind cafeteria lines at all time. Clear height to underside of tray rail or support should be 865 mm minimum.

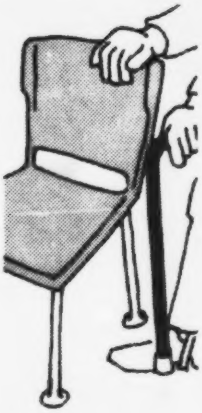
4. At least part of the counter height in a snack bar or cafeteria should be 750 mm maximum so it can be used easily by a customer in a wheelchair.

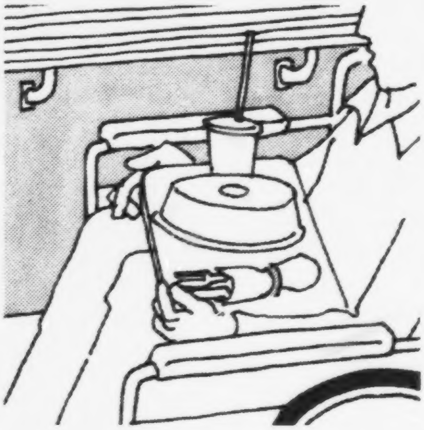
5. Food service areas shall be made accessible according to the standards given in the sections on: *Doors and Doorways, Interior Circulation, Floors, Ramps, Stairs, Counters, Seating, Drinking Fountains, Washrooms, Vending Machines and Signage.*

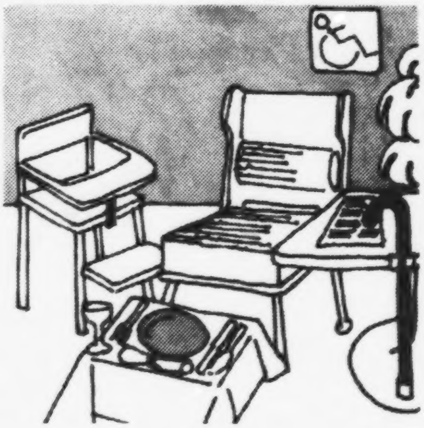
6. If there are fixed or built-in service counters, seating and fixed tables provided in accessible spaces, five percent (5%), with a minimum of one of the facilities described, shall comply with the standards.

7. When a hand or guardrail is used to separate seating then this shall be between 760 mm and 865 mm high.









Design Guidelines

These refreshment facilities should be comfortably accessible for handicapped passengers. This can be most easily accomplished by providing these or the majority of such secondary services on the same floor level as the passenger handling facilities.

The layout should, as far as possible, guarantee the integration of the disabled and should ease communication between staff and the disabled. If there are different levels, ramps and/or lifts must be provided.

Particular attention should be paid to providing sufficient unobstructed manoeuvering space for wheelchair users. Doors and corridors must be designed accordingly.

Restaurants and other services of the same kind should have a sufficient number of tables accessible to wheelchair users. When fixed seats are generally installed, some free-standing chairs should be provided.

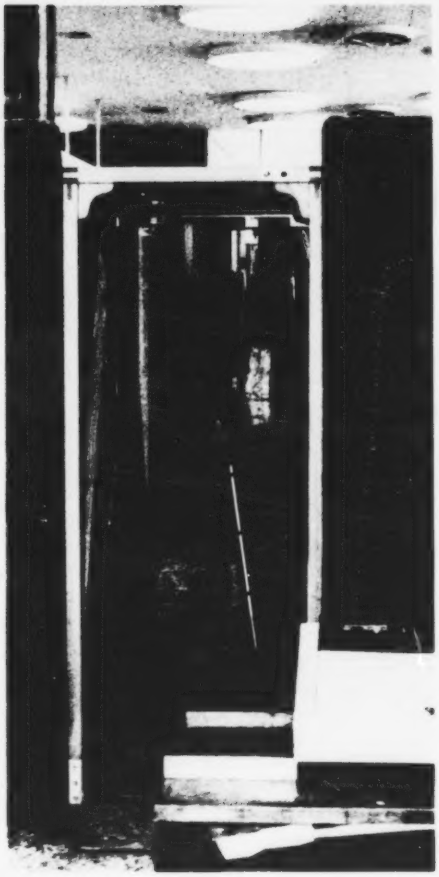
Provide wheelchair users with a space approximately 760 mm wide by 1245 mm deep at tables. A 485 mm deep clearance should be allowed under table, and a 760 mm projecting area should be permitted for the wheelchair. Knee space under tables shall be at least 685 mm high. Circulation space should be beyond 760 mm area.

The clear width between fixed chairs should be 915 mm minimum back to back along main access aisles.

The tops of tables and counters should be from 710 mm to 865 mm from the floor. A number of seats at least 610 mm wide should be available in all food service seating areas for people with protheses. High seats and chairs for children and infants should also be provided.

In restaurants where there are mezzanine levels, loggias, or raised areas, accessibility to all spaces is not required if the same services and decor are provided in spaces located on accessible paths of travel.

19 Security Gates Customs Passport Control



Problems

Passport control counters, security gates, security check points and customs control areas are not always accessible for disabled passengers.

Often the passageway between counters and gates is not wide enough to allow a wheelchair traveller to propel himself. The baggage counter and the personnel counter generally can be too high for lifting a suitcase or communicating in a dignified manner.

The routes to all areas during enplaning and deplaning are not always clear, and especially so concerning special needs travellers. The sight impaired miss most posted signage and directions, the deaf and hearing impaired are unable to hear certain announcements and verbal instructions. Accessibility for wheelchair users and some semi-ambulatory is not always determined in advance.

Function

To check individual travellers, by either walk-through or hand-held detection equipment, for prohibited articles whether concealed on the person or in the baggage.

Identification of goods on a form provided by carrier and given to the agent. Returning citizens and visitors to show personal identification documents and present required forms.

Standards

1. The passenger control areas must be accessible for disabled passengers.

2. The passageways through these areas should be direct and linear wherever possible.

3. Any obstructions must be avoided.

4. Design criteria should conform to standards established for ticket and information counters.

5. The minimum clearance of passageways for wheelchair users must be 915 mm to allow for elbow room when self-propelled travellers are in their own chair.

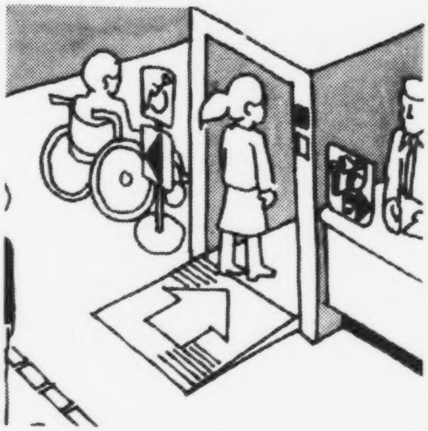
6. If passageway for ordinary passengers is not suitable for wheelchair users, a by-pass passage must be provided.

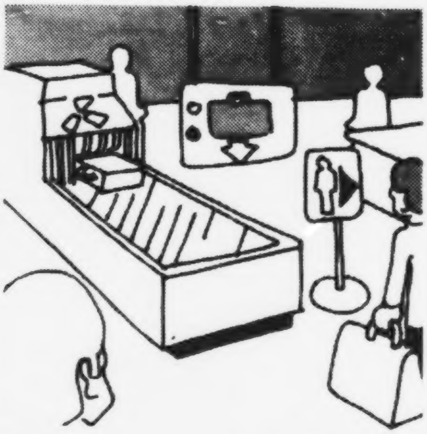
7. Passageways suitable for wheelchair users through security, passport and customs controls should be clearly marked with the international symbol of access.

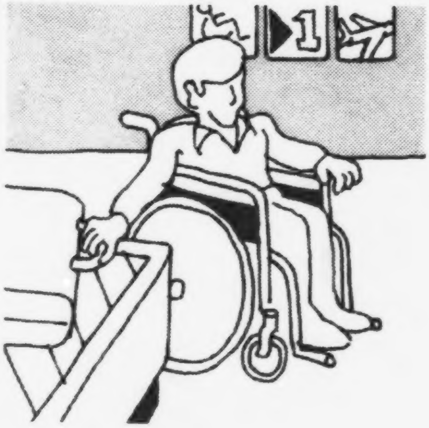
8. Where automatic detection devices are used, alternative passageways must be provided for checking disabled passengers.

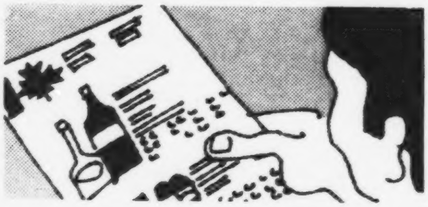
9. If counters or desks are installed in the control area, at least portions of these should have a height of 750 mm (knee space not required) to be approached parallel by wheelchair users. Other counters, for standing at, shall not be higher than 1100 mm.

10. All counters shall be illuminated at a level of at least 200 lux.









Design Guidelines

Instruction as to what the procedure will be should be given well in advance to all passengers, especially those with special needs. Each passenger should be forewarned with written instruction, verbally and/or with clear signage of: where to go, which opening, where to place bags, when to start/stop, where to put camera film (in case of x-ray device), where to go if in a wheelchair or using crutches, and orientation after passing through a particular check point. Forms required to be filled out and handed in at customs and passport control should be designed in such a manner as to facilitate use by travellers who have disabilities.

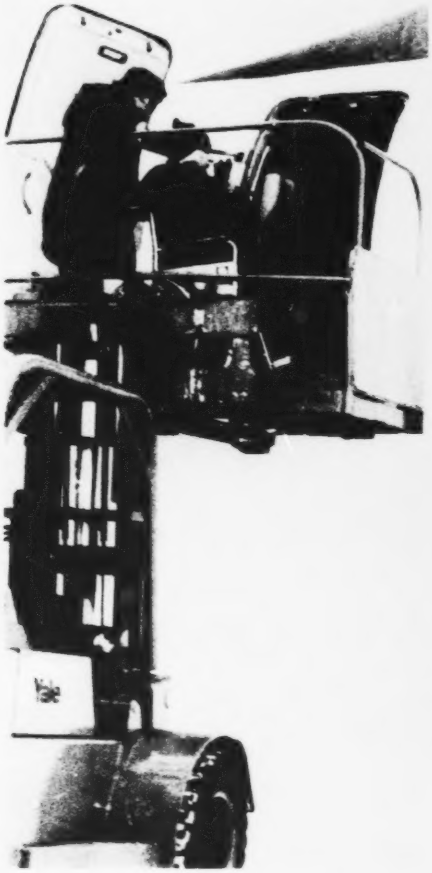
Appropriate and visible warning (pictograph, coloured symbol, etc.) should be given to any person with a disability and/or who is carrying a concealed aid that might either activate or be activated by a surveillance device.

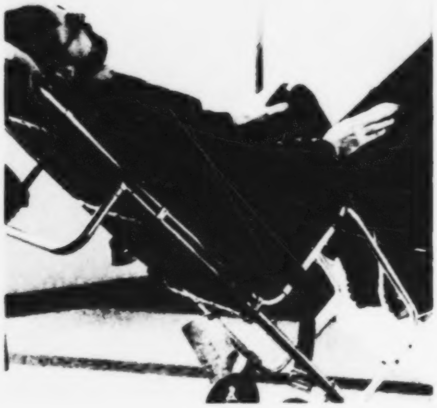
Standardization of procedure sequence, signage, spaces, aisle width and counter levels applying to equipment and devices, should be used. Aisle widths should be no less than 915 mm to allow for passage and self-propelling of a wheelchair. Steep ramps leading into security cages should be avoided. A longer shallower ramp is suggested for the ambulant disabled, elderly and blind. The physical aspects of the security/baggage check of most international airports require further integration and an improved waiting, cuing, baggage and body scan; and baggage recovery, signage and orientation system for both special needs traveller and personnel require further research and design development.

Clear signage showing special needs routes, and tactile/visual cuing areas on floors are recommended for the wheelchair user and sight impaired traveller. The staff of the control areas should at least be advised of the problems in handling the special needs traveller.

20

Boarding Equipment





Problems

When it is required to transfer the special needs passenger from the terminal building, where elevated and covered bridges do not exist, various vehicles and procedures have been employed. Elevating catering trucks and adapted forklift vehicles are used in all sizes of airports.

The small catering truck presents a number of problems when used for transfer purposes; no cover, no guardrail for rear ramp/lift, no tie-down device for wheelchair when on lift or in truck box, windowless interior necessitating keeping box open-ended, unsuitable controls for operation by an attendant and no cover over bridge between elevated box and door of plane.

For the larger aircraft a more robust and extended catering truck is generally used for transfer purposes. Unlike the smaller vehicle this one does not have rear mounted ramp/lift. The distance from ground to floor of truck box is more than a metre and carrier personnel must lift the wheelchair passenger this distance in all weather.

Forklift trucks are used when a loading bridge does not exist, as is the case at some regional airports. The forklift is adapted with platform and safety rails, but a special needs passenger in a wheelchair must still be lifted up to the platform. No cover is provided throughout transfer.

A Washington chair, with narrow seat and high back, is sometimes used to carry the non-ambulatory passenger up stairs. This chair is primarily designed to take special needs passengers down the narrow aisle of an aircraft to the person's seat.

This type of chair is not available for use on trains or buses.

Except for a few prototypes developed for train boarding, no apparatus exists for the handling of special needs passengers in wheelchairs either on trains or buses. For train boarding: steep steps (often slippery), dirt, poor lighting, grab rails not obvious, and often there is no weather protection provided other than directly over the steps. Distance from platform to first step can be as much as 380 mm and this situation is similar when boarding buses. The distance with buses can be as much as 340 mm.

Function

Apparatus, mechanical or other, necessary in the safe, comfortable and effortless lifting of wheelchair based passengers from ground/platform level to floor level of transport mode. The equipment used for boarding at present is not purpose designed and consists mainly of various adapted forklift and catering trucks and the Washington chair.

Standards

No standards available.

Design Guidelines

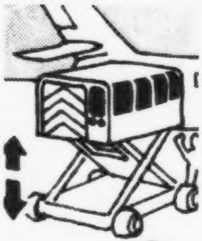
Boarding procedure for the special needs passenger should, at all times, be safe, dignified and without necessitating physical effort on the part of assisting personnel. The equipment used for boarding such passengers and the type and quantity of devices available should provide all the handling requirements of a terminal used for either air or surface based transport.

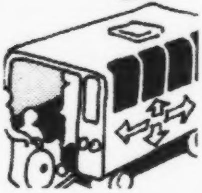
These requirements should be of the highest possible standard of safety and comfort, and equivalent to those acilities provided for all other passengers.

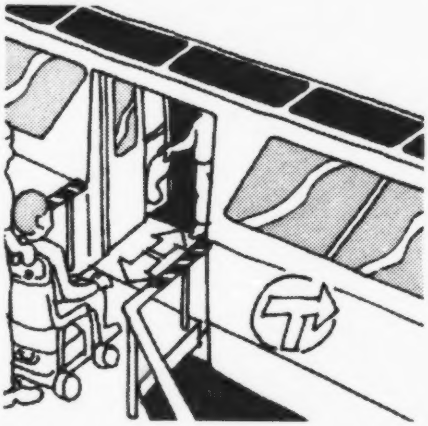
The terminal owned lifting devices and equipment for assisting in boarding, will be mainly for those passengers who are unable to walk ong distances and/or climb steps when a loading bridge, on one level, s not available.

There should be a range of sizes designed to accommodate seated passengers, wheelchair users and an occasional stretcher.

The following vehicles and equipment must be considered obligatory or any airport and/or surface transport terminal where loading bridges, which allow uninterupted horizontal ransfer, do not exist:
carrying chairs, Washington chairs and/or other apparatus which is andled manually by personnel to onvey special needs passengers to nd from transport mode, with or without a loading bridge or a platorm level with door sill.
vehicles with floor level loading, r ramp/lift device capable of transporting wheelchair bound and semi-ambulatory passengers to plane rom terminal building, and lifting hese special needs passengers to ircraft door sill height.
two such vehicles are required to erve the following aircraft:
- for medium sized aircraft e.g. 37's and DC8's, where these cannot e reached by a loading bridge, a afe and comfortable method is equired to board special needs passengers. The vehicle or equipment, o designed, is required to lift the





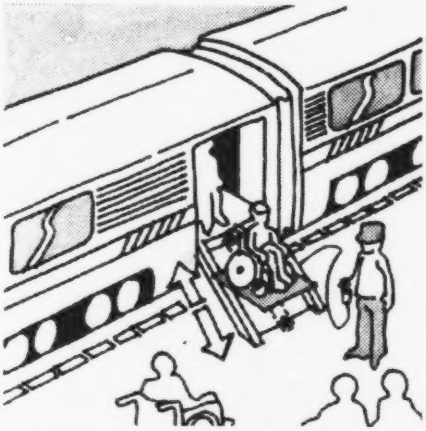


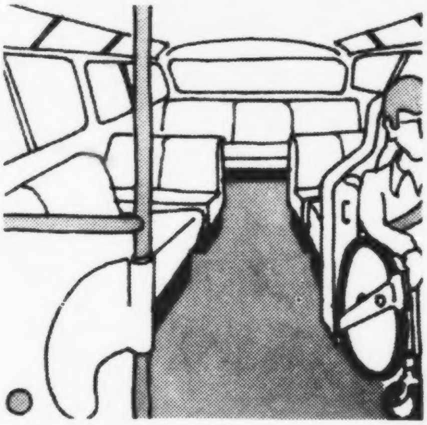
passenger in safety and comfort from apron level to a height of approximately 5 m.
— when such aircraft as 747's and DC10's are used, and the height of the door sill exceeds 5 m, then larger and more substantial equipment is necessary for transfer and boarding of passengers. It is envisaged that this equipment would be similar in concept to the passenger transfer vehicles now in operation at Montreal Mirabel airport, but for use by special needs passengers only.

For train boarding, a manually operated or battery powered device, of a lightweight construction and operated by one service person, should be considered.

Bus boarding and bus deboarding poses certain problems because of narrow door openings, steep and sometimes curved steps and extremely narrow aisles.

On the other hand this mode of travel, compared to plane and train is inexpensive, popular and often





situated in urban and rural areas not often served by other forms of public transport.

The following alterations might be considered in lieu of providing special boarding equipment for each bus, or replacing existing buses:
- boarding might be through the front or side door with modifications as necessary. A new rear door for wheelchair access could be a modification to an existing bus.
- the platform/bridge would be terminal-based initially, to be able to provide the necessary assistance, a special boarding chair and weather protection for the special needs travellers.
- certain seats on the buses would need adapting to take those travellers who are non-ambulatory and who might be wearing protheses, etc.

If an existing bus was modified to provide rear loading for a wheelchair passenger, then a suitable space and tie-down system should be made available for up to two wheelchairs.

21 Baggage Claim

Problems

A main problem for travellers generally, is the identification of baggage when an automatic system is used to convey baggage from a transport mode. Colours, shapes, sizes, and even identifying labels and markings all seem similar when many pieces of luggage are together. For the special needs traveller, who is confined to a wheelchair, sight impaired or semi-ambulatory, problems of identification and retrieval are compounded on one another.

Such mobility limitations and problems related to identification make assistance necessary for many travellers.

Devices for conveying bags come in all forms, too often these are positioned either at an awkward angle, e.g. carousel; or at height which might not suit all travellers, e.g. conveyor (continuous belt or link type).

Any moving system from which a bag, often overweight (for one-handed manipulation), has to be first identified, then grabbed, possibly, through a barrier of fellow passengers makes retrieval a feat requiring athletic alertness and dexterity.

Baggage carts are not always provided in the vicinity of the baggage conveyance, and no carts are reserved for the special needs traveller. Carts are not of a design which is compatible with baggage scales, counters, carousels and conveyors. Taking baggage from a cart and putting it on the conveyance device, also requires considerable effort with lifting and carrying. Awkwardness and discomfort usually result as cart seldom moves where directed.

Function

A place at a traveller's destination where personal baggage is identified and claimed from carousel, conveyer, or counter. This facility is not normally staffed by personnel at airport terminals.

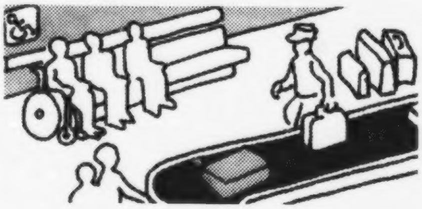
Standards

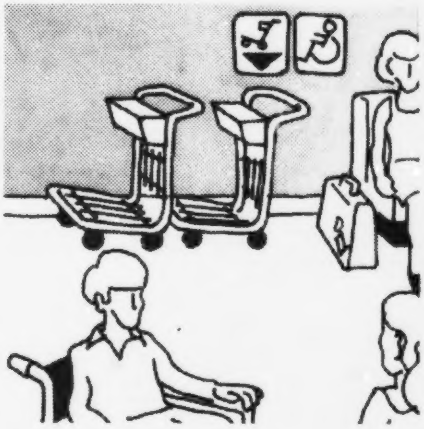
1. Carousels, conveyors, baggage scales and fixed counter platforms shall be of a suitable height for taking bags, unassisted, by most travellers.

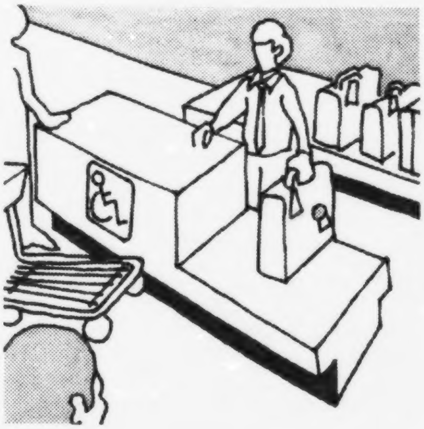
2. Existing baggage conveyance systems vary in height and general dimensions. Circular carousels can have a curb height of 360 mm from floor level with curb top width of 100 mm. A horizontal, link conveyor can have a height of 320 mm. A baggage scale, positioned near a fixed counter, can be 300 mm high.

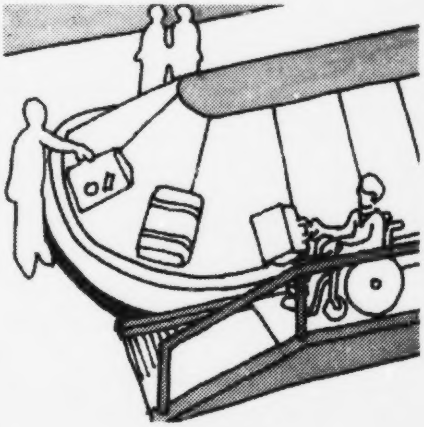
3. Lowest reach, without bending of average elderly adult is 610 mm. Lowest side full reach of average adult in wheelchair 390 mm.

4. Sizes of luggage range from a man's large pullman 710 mm by 508 mm by 178 mm to a woman's large case 635 mm by 458 mm by 178 mm. On conveyors and carousels those pieces might arrive to the traveller upright or on side, close or far from edge. The weights will vary considerably.









Design Guidelines

It is specially important to make sure no disturbing situations arise for special needs passengers while amongst other passengers on arrival. For disabled people able to walk, e.g. on crutches, in the baggage claim area, seating should be offered to give them the opportunity to wait until the main rush has passed.

The disabled person should receive his own wheelchair providing he did not get in it at an earlier stage.

Baggage carts should be reserved for special needs travellers able to walk. Porters should be instructed to be of assistance to disabled people.

In particular disabled as well as elderly travellers require assistance at the baggage claim when taking the baggage from the delivery device (e.g. conveyor belts). Assistance should be made available here and a sign should indicate that such assistance is provided.

A special low counter of a design compatible with baggage carts and attended by a member of staff would be helpful for those travellers not able to pick up baggage from moving conveyors. The bags would be collected and placed at the special counter by an attendant who would also provide necessary security. The existing delivery devices could also be made more accessible for the special needs traveller by providing suitable spaces only for disabled to stand or place their wheelchair. These spaces would be texture/colour coded on the floor and kept clear by other passengers.

Ramped platforms, wide enough for wheelchairs and safe for other special needs travellers would help in overcoming awkward heights of carousels and conveyors. As much as possible should be done to make the baggage claim area accessible to special needs travellers and to give each person a feeling of independence when using these facilities.

4. Recommendations

Recommendations

Our testing and observations have clearly shown the main areas which have to be addressed in future in order to improve accessibility for special needs passengers in transportation systems. We therefore recommend:

- Testing, implementing and, in some cases, further developing our design guidelines for the different fixed facilities.

- Designing unified and coordinated information elements such as signs, symbols and visual display screens for all transportation systems involved.

- Developing communication aids for the blind, hard of hearing and persons with speech problems.

- Designing equipment to improve accessibility to board bus, train and aircraft in a dignified and safe manner. This would also result in relieving service personnel of strenuous physical effort they undergo at present (i.e. lifting wheelchair travellers).

- Designing an Access and Identification Program to connect incomplete links between the special needs community and service groups.

General measures

- Prior notification by means of a registration form which will be completed by the handicapped person when reserving an aircraft seat. Thus the airline concerned is informed in advance about any special requirements needed for people with disabilities. The airline is then in a position to make the necessary arrangements for equipment and staff prior to the arrival of the handicapped person at the airport.

- Airports with more than one passenger terminal must offer appropriate transport facilities — especially for handicapped passengers transferring from one terminal to another.

- If possible car-hire firms should supply hand-controlled cars on prior notification.

- Hotels within the airport area should be accessible for any handicapped person.

- First aid and ambulance service should be available at all transport terminals.

- Announcements and signposting should take into account the problems of people with impairment of sight or hearing.

- Standardization: signposting, colour schemes, guidelines etc. within an airport should be standardized according to an internationally-accepted design.

Training of staff

All personnel — including security personnel and guards, porters etc. — involved in passenger handling activities should be adequately trained (e.g. by means of training courses) in the following subjects:

- What kind of facilities and procedures are available at the airport for the benefit of handicapped people?

- Who is responsible for assisting the handicapped and what organizational measures have to be taken in respect of any possible assistance?

- At what stage does a handicapped person generally require assistance?

- What factors have to be carefully watched when dealing with or assisting handicapped people?

In addition staff specially dedicated to assisting people with disabilities should receive additional training on medical and psychological aspects (first aid, kindness, dedication and sensitivity to people with disabilities).

Furthermore this training should include the functioning and the handling of facilities and equipment available.

Liaison with organizations for the handicapped and similar institutions.

It is appreciated that existing airports are not in a position to incorporate all the recommendations in full within a short period of time.

In addition there is steady progress on the various ways of assisting the handicapped.

Therefore it is urgently recommended to put the suggestions in these guidelines into practice successively, possibly in close cooperation with national and international organizations for the handicapped as well as with similar local public welfare institutions.

Glossary of Terms

These terms are simplified definitions to be treated solely within the context of this study.

Special needs passenger:
A travelling person with an inability to perform one or more of the actions normally required by existing transfer systems at a safe and comfortable level of proficiency at the various types of transportation terminals.

Transfer:
The change from one transportation mode to the next or within modes and all attendant tasks necessary between leaving one mode and entering the next.

Transfer links:
Horizontal and vertical routes that connect one service area with another.

Information:
Perception of visual, audio and tactile signals.

Communication:
Exchange of visual, audio and tactile signals.

Orientation:
Use of information in relationship to one's position and the total building.

Service areas:
Specific architectural areas which provide human, mechanical, electrical or electronic services.

Perception:
Receiving of information through eye (visual), ear (audio), touch (tactile), nose (smell) and mouth (taste and speech).

Perceptual impairment:
Certain senses necessary for receiving stimuli are either partly or completely non-functioning.

Physical effort:
Body function when muscular system is activated to perform a task.

Physical impairment:
Certain body functions do not perform in a natural manner.

Mobility:
Ability to move either independantly, with the aid of equipment or with human assistance.

Transfer vehicle:
A form of powered device used to assist the movement of people during transfer situations.

Ergonomics:
Man-machine relationship.

Standards:
Approved uniform solutions on municipal, provincial, national and international levels.

Recommendations:
Suggestions for solutions which have not yet been fully tested.

Design guidelines:
Suggestions for design oriented solutions (concepts), although untested they are based on close observations, the availability of information and on realistic approximations.

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Appendices

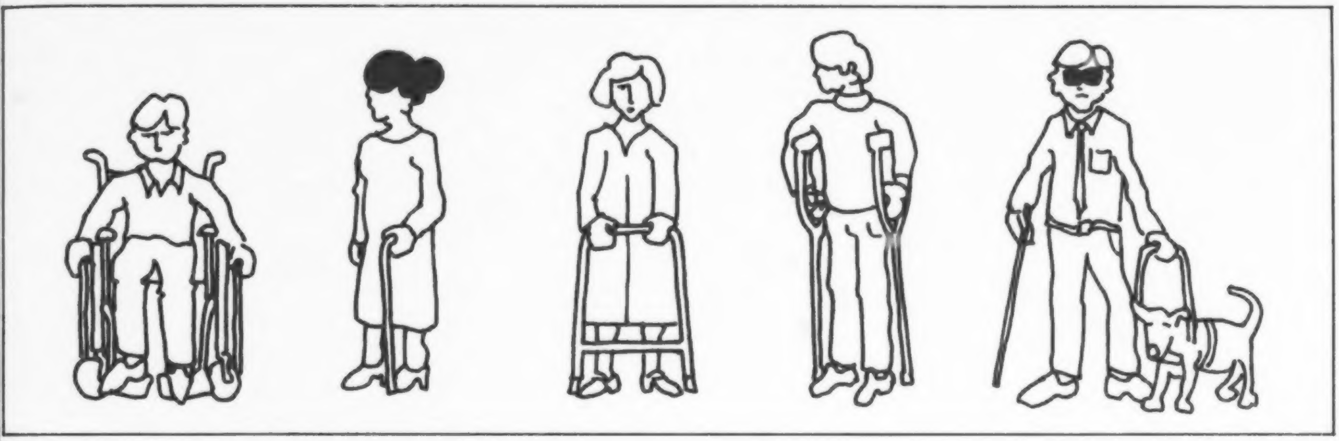
Appendix A

Human Data

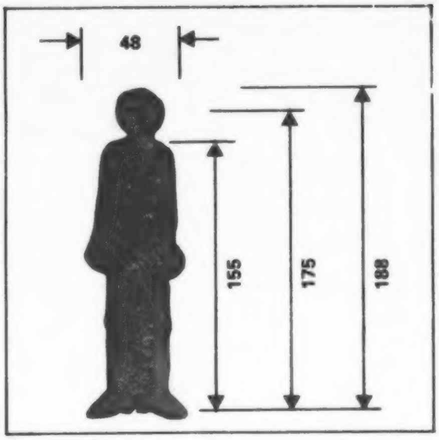
The following dimensions are given to provide a general understanding of space needs of the physically handicapped. This information can also aid in planning beyond needs covered in this report.

The standards shall take precedence over dimensions presented in this appendix, should a conflict arise. The variance in the figures results from differing physical needs in the use of each item. Therefore, this appendix should be used as a guide.

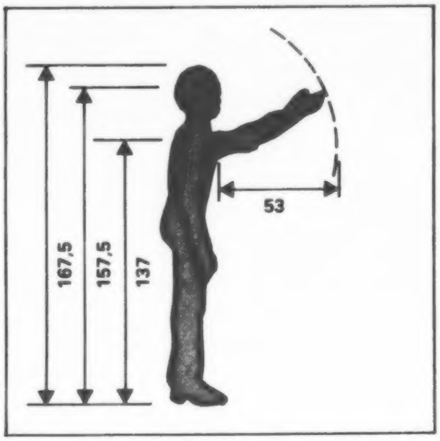
Dimensions for persons handicapped by extreme size (short, tall, overweight) are given for the second standard deviation. The "large male" depicts a size that excludes only 2.5% the "large" population. The "small female" excludes only 2.5% of all person on the "small" side.

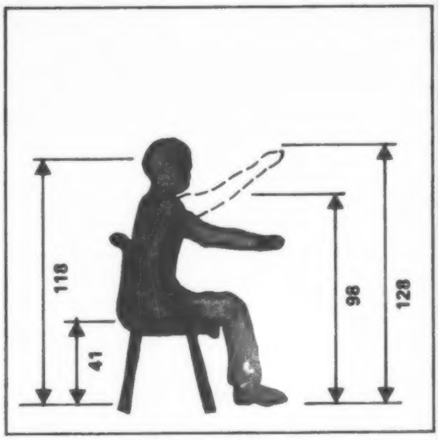


Large male

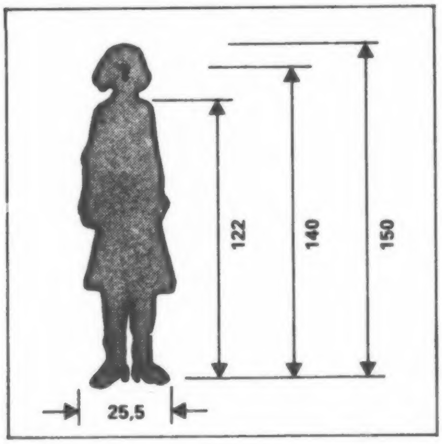

48
155
175
188

Average adult

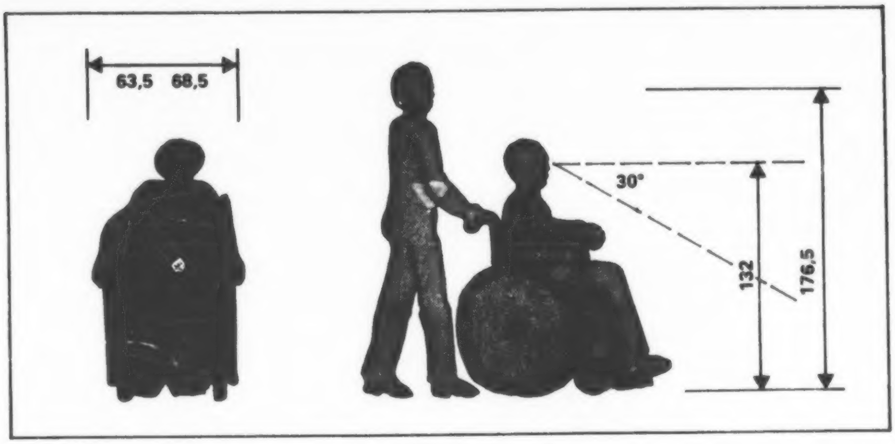

167,5
157,5
137
53


118
41
98
128

Small female

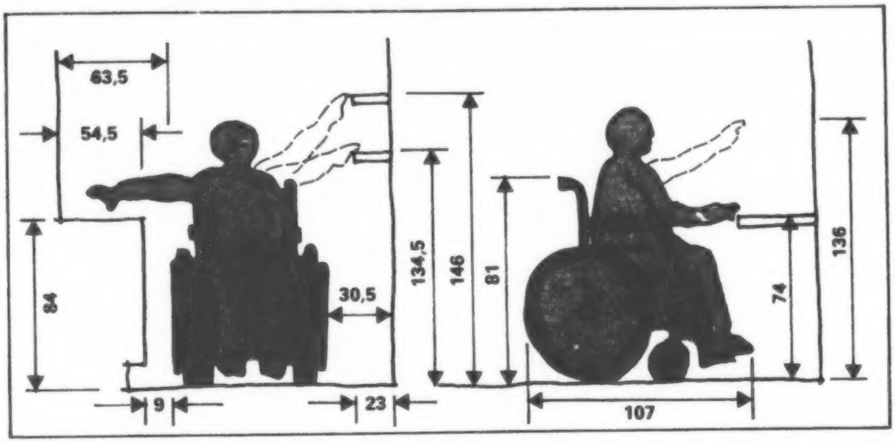

122
140
150
25,5

Chair bound
Sight



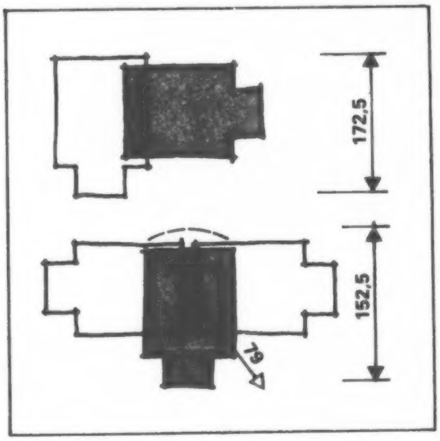
63,5 68,5
30°
132
176,5

Reaching

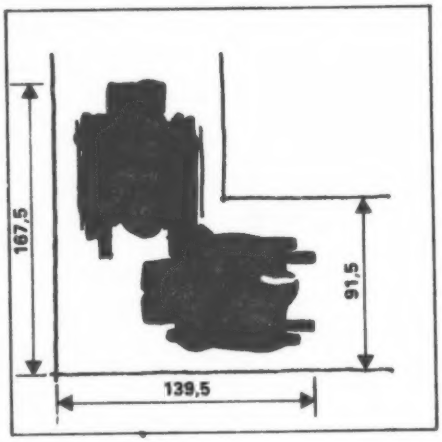


63,5
54,5
84
30,5
134,5
146
81
74
136
9
23
107

Turning 90°
Turning 180°



172,5
152,5
76



167,5
91,5
139,5

Appendix B

Terminal Summaries

1. Toronto Terminal I — Summary

Upon entering the terminal building, the disabled traveller has good, wide automatic doors to assist in access. These doors are the swinging type and although an advantage to the semi-ambulatory person and the wheelchair user, they are a hazard to the blind and/or the partially sighted.

There is no cuing system to enable the blind to find out which direction the doors open, entrances and exits. Also, when the doors open inward, they are a potential danger to the sight impaired person walking inside the building, or trying to find the exit.

Once inside there is no orientation plan to assist in finding one's way around. Directly opposite one entrance, for example, there is a CP Air counter for special services/standby. This sign is not prominent enough and becomes lost amidst other signs, etc.

Counter heights are generally too high for most people, not just the wheelchair user. A suitable height would assist the agent also. Deaf and other hearing impaired passengers are often obliged to communicate in writing.

Information generally is somewhat incomplete for the disabled, especially for the blind, in identifying such things as a ticket counter belonging to a particular airline. The logo is often placed high up over the counter or on the wall behind the counter, out of reach for the sight impaired.

From the point of check-in, the traveller is free to wander around, if he is able, using all the facilities at his disposal. These include washrooms, telephones, lockers, duty free shops, snack bars and restaurants, water fountains and elevators to the lower levels, also post boxes and stamp dispensers, vending machines and seating.

Unlike Terminal II, where a 3-dimensional plan of the terminal is provided with an orientation position, there is no such guide available in Terminal I.

In Terminal I, the best information was provided above the elevators to the lower levels which are situated off the main circulation area at the front of the building. Such directional guides are of course no help to sight impaired travellers.

Information generally is in the form of large (610 mm × 610 mm) black signs with white symbols and/or lettering. These are mounted on the walls over the service described and they project above the circulation areas. They are approximately 2500 mm above the floor level.

There are other signs which are back-lit, and these have black letters and/or symbols on white opal plexiglass. This of course is the reverse of the white symbols on the black background as used for wall mounted signs where the main information is displayed. It is quite possible that a certain amount of confusion may arise in having this reversed, as to clarity and quick recognition of information and/or direction.

As an example, upon entering the terminal, the displayed signs along the walls are possibly the first to be seen and contrast between symbol and background is soon established. Walking along the main circulation corridor the traveller might miss the information which is situated overhead, despite the fact that it is back-lit, because he is tuned into the reverse, or negative, of the symbol shown. Here again, sight impaired passengers cannot take advantage of the wall signs without modifications.

Signs which are not back-lit tend to get lost in the shadows of the interior of a building especially if there are large areas of glass and supporting columns. Placement of such signs still has to be considered carefully. Sequence is also an important factor, and should work in both directions.

Glare is also a problem either from below or above as in high or clerestory windows. While the disabled traveller is more likely to be distracted than the average person these points are intended to improve transfer for all.

Video displays in Terminal I are either too high or angled improperly. The character size is also small for even close scrutiny. Clocks were positioned too high and in places not always obvious. Kiosks and signage often obliterated these.

Seating along the circulation area as well as in the lounge or the general seating near ticket counters was often too low. The angle or incline of the seat was such that the elderly had difficulty in getting up unaided. This is felt to be of major importance and an item that could be readily modified.

Water fountains are not completely accessible although they did project from the wall and there happened to be knee space under for the wheelchair user. In most instances the person was unable to get close enough and the fountain was still too high for an adult seated in a wheelchair. The tap push control with a small surface to exert pressure proved a problem for the quadraplegic and others who had limited use of hands and difficulty in providing point pressure.

For the above disabled people, washrooms were also difficult to enter although the facilities inside were *accessible*. While seated in a wheelchair, whether the person be paraplegic or quadraplegic, the swing doors with a large flat push plate on the outside and closed, vertical pull handle inside, are just too awkward to push open. The resistance of the self-closing device was too great. An overall review of door opening and closing mechanisms would appear to be strongly justified.

Inside the washrooms there are only a few problems, the cubicle for the disabled is not marked and probably because of this fact was in use by a non-disabled person. The mirror was positioned too high to be used by the wheelchair user being 1210 mm from the floor to the bottom edge. A special lowered sink has been installed but this proved too low for use by even the wheelchair users. Exposed pipes are a hazard to knees even if the wheelchair could get close enough.

Finding suitable facility for enjoying a simple cup of coffee and a doughnut proved more than just a straightforward task for the person in the wheelchair. The only fast food place has a high counter and the eating surfaces were high enough for standing but not suitable for the person seated in a wheelchair. Items like paper napkins, condiments and coffee stirrers are also out of reach for this person. In fact we were told by the person who was in our test that he just *could not* use that place and would not even attempt to.

The self-serve restaurant is another area where certain problems arose for many of the test travellers. First of all the heights of basic items like trays; when stacked up these were fine, but the height of the stack changed as trays were taken. Also, a person with difficulty gripping would not be able to separate the trays without effort. Picking up a hot meal handed to him by the kitchen staff proved to be a problem for the wheelchair user and other disabled patrons. Staff assistance did prove to be helpful in problem areas.

In the dining part of the restaurant items like some fixed bench seats are also a problem. Awkward and uncomfortable manoeuvring was necessary to get out from behind tables which are closely spaced.

When a flight is announced, travellers must rely on their ears for the boarding information. Initially, these details are given to them verbally with seat number, gate number, and boarding pass, when they check-in. How many travellers, without a physical or perceptual disability forget, by the time they reach security, which is which?

For the disabled traveller, especially the aged, the partially sighted, the blind or the hearing impaired, it is important to strengthen and have this information repeated by different means through the period from check-in, through security and on to boarding. The visual display on the CRT screen is one familiar method to give the traveller up to-date information regarding departures/arrivals. Unfortunately, this medium is often improperly placed. It is either too high; lost behind other signs; the read out is too small; there is too much glare on the screen and it is not positioned carefully enough i.e. at orientation points, where it can be seen without being in the middle of a circulation corridor as in Terminal II.

If the traveller has managed to find his way from the ticket counter, through other intermediate services including security check, he will make his way along the gently curving passageway to the separate gates, boarding bridges and *steps* which lead to the plane.

From the entrance through all the main and intermediate services right up to the boarding bridge, the disabled traveller has been able to proceed through all these stages on one floor level. Now he is faced with the anxiety and danger of boarding if his plane is at the far bridge.

The entire boarding sequence is quite unpredictable and lacks uniformity to aid all travellers. The lower-limb amputee, who is able to walk with artificial limbs while on one level, is confronted with a flight of steps going down to a ground level passage. This leads to another flight of steps up to the actual boarding bridge. This procedure is only necessary if the plane is parked at the *far bridge.* If it is parked at *the near bridge,* the procedure for boarding is straightforward, as in Terminal II, for all travellers, including those in wheelchairs.

In the case of a disabled person in a wheelchair whose plane is boarding at the *far bridge,* his predicament is extremely awkward if not imponderable. If the wheelchair user was aware of such adversities in boarding a flight out of Terminal I, or connecting with another flight through this building, then we feel even less would travel.

The procedure for such an unsuspecting traveller is as follows: he is wheeled through the narrow counter opening underneath the "special need/standby" sign, into the "private/staff only" space behind. There is an elevator here which goes down to ground level. There he is wheeled along narrow baggage handling corridors and up a steep ramp towards a door leading to the garage/service area.

On the occasion we tested this procedure, this door was found to be locked (with an intricate button operated security device) and the test traveller was then wheeled back down the ramp by the ground hostess.

Another door was found in the baggage claim area and we proceeded through the people, identifying their baggage on the carousel, and then through into the garage space where the movement of baggage carts and vehicles was constantly in progress.

Considering this was a standard procedure for a traveller in a wheelchair getting to this plane at the *far bridge,* there were no signs, lights, road warnings or other signals to help those in vehicles beware of a disabled traveller in a wheelchair being pushed by an attendant.

Once outside the garage, the conditions are different, but equally hazardous. Snow, ice, wind, accompanied the smell of high octane fuel and the noise of jet engines and service vehicles of every description assault the passenger as he is manoeuvered across the apron.

The distance from the garage to the boarding bridge is another unpredicable element in this transfer procedure, and once the traveller is at the required bridge, he is then lifted up a long narrow flight of external steel service steps to the bridge and level with the plane door. The other, internal stairs are covered and are used by the able-bodied passengers boarding the same flight.

In deplaning, the procedure for a plane at the *far bridge* would be reversed and the wheelchair user would probably use the internal stairs, but assisted all the way.

Baggage claim and customs/immigration mean more steps for all travellers and the disabled in a wheelchair faces a predicament once again. Even though assisted, the procedure is not a simple one nor is it free from trauma or hazard for both traveller and attendant.

2. Toronto Terminal II — Summary

This terminal is the newest of the two terminal buildings. The main entrance doors are automatic sliding doors, activated by a pressure mat. The position of these doors is not clear for the blind or sight impaired and a cuing device would be helpful.

Once inside the terminal, it is not immediately apparent where one is located in relation to services. There is a three-dimensional floorplan available to passengers which is somewhere in the terminal, but not near the entrance where it is required for quick reference by the departing or arriving passengers. The design of this plan is unsuitable for use by the disabled person especially the blind or the wheelchair user.

Opposite the entrance at the domestic end, the Air Canada ticket/check-in counter is located. The airline is not identified on the counter front but above. This is confused with other information; the airline symbol (logo) does not seem to be used anywhere on these signs. This logo would help the partially sighted passenger in identifying the relevant carrier. The logo used in relief could be used as a "standard" by the blind and also appear on orientation maps.

The sign for "special assistance" travellers was lost in the information above the counter. This sign would be of no help to the blind. Once the special need traveller has identified himself to the carrier, he is asked to wait on the seats provided. These are in a good position, close to the counter, but are not designated by a sign. Unfortunately, they are not comfortable to sit on. Wheelchairs are available at this position. There are three types of chair here; the small wheeled type, the large wheeled type but with handrims taken off, and another type with odd parts missing (e.g. one had only one handrim).

From this point on the special need traveller would proceed with an attendant pushing a wheelchair if necessary through the security check. This was a cage-like affair (timber frame) with ramp. While the traveller went through the security his hand luggage was taken via the conveyor. The person who was confined to a wheelchair is led around the cage and checked with a hand-held device.

After security the disabled traveller would remain in the wheelchair provided or he would be met by one of two types of electric vehicle. The smaller one takes the traveller to the door of the plane along the loading bridge. The longer, articulated, vehicle can accommodate more passengers and both can operate within the passenger area running the full length of the terminal building. These electric vehicles are quiet and fast and the corridors are wide enough and the spaces open enough that passage of the vehicle goes unhindered. Neither is equipped to transport a wheelchair passenger.

The only boarding problem forseen is not with Air Canada or international/domestic flights, but with Air Ontario. The check-in counter for AO is at the far end of the departure level. The only access to the plane is via stairs down to the runway. A new seat lift has been fitted alonside the stairs to assist disabled passengers but unless wheelchair passengers can transfer to the chair, accessibility is severely limited. Once at ground level, these travellers are faced with another problem and that is boarding the aircraft from the runway level. After they are at ground level a wheelchair is provided for those who are unable to walk to the plane. This is, of course, done across the exposed apron. Once at the plane the problem of getting the disabled traveller from apron level to doorway becomes dramatic and potentially hazardous for both passenger and assistant(s) by reason of lack of modern facilities.

For this transfer a number of devices may be used: a forklift with open, uncovered platform; a covered catering truck with scissor type elevating mechanism (these are usually windowless and the roof is often too low to make transfer comfortable for the assistant). The discomfort for the passenger would be in getting into the truck, as the floor of the truck is quite high. At this point, the disabled traveller has to be lifted, while still in his wheelchair, and this can be a problem in inclement weather.

Arriving passengers in Terminal II, leave the planes by way of the loading bridge and then make their way to the level below for customs/immigration and baggage claim. Disabled passengers, who cannot use the escalators provided, must take the elevator, which happens to be *outside* of security, after this they are assisted with their baggage claim and customs inspection, etc.

Once these passengers have been cleared by customs and they have claimed their baggage, they are then able to walk or wheel (assisted if required), into the public zone to meet friends or relatives and link with the various modes of transport at their disposal for transfer or otherwise. The graphic symbol used for this particular meeting place is confusing. It is used in two colours; one black on white and the other (in the international area) blue on white and the symbol is unique so many passengers do not know what it stands for.

As it may be necessary for certain travellers to go from Terminal II to Terminal I, to connect with other flights (e.g. CP Air etc.), there is a long tunnel linking the two terminal buildings. It is possible to walk the long distance or to use the moving sidewalks which are provided in this tunnel in each direction. Unfortunately, this tunnel is only reached by a long escalator or flight of stairs from arrivals level (Terminal II). In fact, if transfer between terminals is necessary for a disabled traveller, he/she has to be carried down the stairs, in a wheelchair (if used), to the moving sidewalk. In Terminal I there is an elevator to the lowest level (tunnel level). All other levels are accessible by elevators and therefore, suitable for the traveller confined to a wheelchair.

3. Toronto Union Station — Summary

The entrance doors are the first items which need improving for the disabled. There is inadequate signage to show which doors can be used, the blind and partially sighted are only aware of this through trial and error and this is both awkward and dangerous. This situation is repeated with the inner doors.

Signage for redcaps is not posted, if the furthest entrance is used, to assist in finding the redcap position. A red light is above where the redcaps are seated and waiting to assist travellers.

The information counter is situated opposite the row of positions for ticket purchase. This counter is visually distinguished by a green light overhead. There is another information counter where a display of brochures stands on the counter top. The board display showing the time, departures and arrivals is directly opposite the information counter and centrally positioned in the main hall. The lettering size on the display is too small for most travellers to use at a glance and glare on the transparent cover is disturbing. The clock is in a good place, above the display, but the numerals are too small for the seeing impaired and others.

From the main hall, one goes down a ramp into the area where the track gates are found. Also at this lower level are seating, vending machines, drinking fountains, telephones, washrooms, shops and fast food services. All these facilities are inadequate for disabled travellers and need to be considered more seriously. Washrooms and fountains are extremely old and need improvements to bring them up to basic minimum standard of accessibility. However, accessible washrooms are available in the main concourse.

Another problem of accessibility is when the traveller goes through the appropriate gate and up stairs to the train platform. These stairs are a problem for many disabled. For the wheelchair user, they are impossible.

The traveller confined to a wheelchair, or in need of a wheelchair, is assisted by a redcap and taken to the train by one of two ways. He is wheeled up a long, narrow passageway which leads from the main hall to the first platform at train level. He is then pushed across track areas over platforms near the open end of the station. This, of course, is a bumpy, noisy and often cold ride in inclement weather. At other times, an approaching or stationary train might be both an inconvenience and indeed hazardous.

The other procedure for wheelchair travellers is to go down to garage level and wheel through the congested and noisy garage area. At this point, a cargo platform is used to elevate the disabled and his wheelchair, attended but without the practical and psychological security of a guardrail. Both the wheelchair and attendant are then level with a traditional high and narrow baggage cart. The disabled traveller, while on the cart, is then pulled by a cargo vehicle into the elevator cage, one elevator to each platform, which takes him up to platform level.

When on the platform, the baggage cart is manoeuvered up to the train and then the wheelchair traveller is taken off at train floor level. For the first procedure, the wheelchair user is lifted from platform to train floor (by at least two attendants), up and over the steel mesh steps.

4. London Airport — Summary

This is a small, regional airport which handles predominantly domestic flights, but with the occasional charter flight to Florida.

The entrance to the airport terminal is protected from inclement weather by a recently constructed cover over the sidewalk and a screen in front of the entrance doors. This is presumably to keep snow and rain from affecting the travellers using the entrance as well as preventing the cold and wind from entering the terminal when the doors are used during particularly busy periods.

On entering the terminal building, through automatic swing doors, with a substantial lobby in between, one finds the Air Canada ticket/check-in counter immediately opposite. On the right is the office of Air Ontario and the position in front is where three of the four available wheelchairs are kept.

For the disabled traveller who arrives in his own chair, Air Canada provides the facility for protecting the wheelchair with a special polyethelene cover and in the case of a powered chair, a box for the batteries, complete with plastic bags and tape to seal the bags. The batteries are separated from the chair and stored in this manner on the plane, in the baggage compartment. For transfer to the aircraft, a wheelchair is then provided by the carrier. We have been told by one test traveller who has used a personal powered chair on flights that, in the above procedure, damage was once caused to the electrical system of her chair by inexperienced personnel.

The traveller, whether he be disabled or able-bodied, is not provided with any cover, such as a loading bridge, when he boards the plane. If he is confined to a wheelchair, the traveller can be lifted up to the door of the plane, often a DC-9 or Convair, using a fork lift truck (which has been converted to take wheelchair-bound passengers). No cover whatsoever is provided over the platform.

The person in the wheelchair is never unattended. The ride from the terminal to the plane, while seated in a wheelchair on the moving platform, is probably quite a bumpy one because of the type of vehicle which is being used for this purpose. In winter, with ice and snow on the ground, this makes the transfer to the plane particularly uncomfortable for the disabled or invalid traveller.

In the terminal itself, the facilities for the disabled and other passengers are generally quite good. The signage is clear and large enough to be seen by all but the sight impaired and blind. All signs have been positioned quite carefully so as not to be misleading and such items as special telephones and the x-ray baggage-check machine are provided with identifying signs.

For telephone identification, official and unofficial symbols are used to show the phone as one suitable for the hearing impaired. The telephones do not have a practical shelf for a directory.

Bill changer, coin changer and stamp machine are grouped together and look tidy in appearance, but are high for the wheelchair traveller. Also, the design of the machine makes it awkward, if not impossible, to use by the upper extremity impaired or amputee.

Coffee dispensing machine had large selection buttons making the machine accessible for most of the test travellers.

There was a hotel reservation counter — with telephones and location map. This map had no braille or raised letter identification to indicate the different hotels. The map was of no use to the sight impaired. The telephone on the shelf was a good idea for the amputee and for others with a gripping or holding disability. The projecting counter and sides were a hazard to a blind person as no cuing was available either on the floor or elsewhere, to warn of the projection.

The washroom is accessible with a swing door and a self-closing device. The restroom is a generous size with seating provided. A special cubicle is available for the disabled traveller. The door to this cubicle swings in both directions, but this is not evident at first. It is better to have the door pull outward for the person in the wheelchair which could be possible if a grab handle had been fixed. The locking mechanism proved difficult to operate for upper extremity impaired.

Seating in the airport is too high for the elderly and lower extremity impaired. Upper extremity impaired persons also had difficulty in getting up from the seating in the lounge area. Armrests would have been helpful for both aged and disabled. Low tables have sharp edges and project into circulation areas making them hazardous items.

The observation level can only be reached by stairs. A turnstile is positioned at the first landing and a coin has to be deposited in order to get through the turnstile. Stairs, turnstile and the door leading to the observation balcony make it difficult for the disabled person and totally inaccessible for the wheelchair user.

Once a passenger had deplaned, the doors leading into the terminal were outward swinging and the lobby in between was narrow. The doors would be difficult to open for a disabled person with an upper extremity impairment, and cuing here would be beneficial for the blind or partially sighted.

5. London Train Station — Summary

Entrance doors are manual outward opening. A ramp is not evident outside entrance and there is no sign showing accessibility for the disabled and wheelchair user. These doors are hinged and both these and the internal doors open in the same direction. There is a substantial lobby between these doors but a wet floor here proved a hazard for all people using this entrance.

The ticket counter is easy to find, as the terminal ifself is quite small. It is located in part of the ground floor of the CN office building. The ticket counter does not have any form of identification on the front, only above the counter, to show that they are, in fact, ticket counters. The height of the counter is not suitable for a person in a wheelchair.

The seating, located in the front of the ticket counters, does have armrests but these do not extend to the front of the seat. Seating generally has shown to be problematic for most disabled and elderly travellers.

Washroom doors are located on either side of the drinking fountain (operation of fountain was difficult for the amputee) and the wall between the two doors was not wide enough to accommodate a person drinking. Adequate clearance should have been provided here for a person while drinking so he did not interfere with the doors to the washroom and vice versa. The doors to the washroom were of a standard size and the opening system consisted of very basic, domestic type doorknobs. The lobby on the other side was not of a sufficient size to manoeuver a wheelchair satisfactorily.

Inside the washrooms there are no special cubicles for the disabled person and the locks are difficult to grip, especially for people with hand and finger disabilities (upper extremity impairments). The mirror is too high to be used by a person in a wheelchair.

General signage is not good and certain, important, signs are not in use. The information counter is not easily identified and is not provided with an opening where one usually stands to make enquiries.

The main sign for departures and arrivals is not far off the floor and letters and figures could be felt by hand, by the blind, if necessary. The clock is not in an obvious position for travellers but can be referred to quite easily by the ticket agent. There is no sign for special assistance and no green light identifying the information counter.

The vending machines are not easy to use and some are impossible to use by the disabled. Coin slots, selection control (e.g. push or pull knobs, retrieval of food, candy or cups) cannot be used without much effort and danger of spilling hot contents.

Lockers are not easy to use and the grab handle, money slot, key retrieval (and in the case of the blind) identification — all these things proved to be problem areas for the disabled.

When leaving the waiting room/ticket counter area in order to get to the train, a ramped floor leads upwards to the covered platform outside. This floor is of the same terrazzo material and continues throughout the building. Mats are provided here but can be a hazard as they were not fixed to the floor. There is no handrail to assist and the incline of the ramp made it difficult for the disabled in a wheelchair to go up the ramp unassisted. There was also a rope separation barrier, but it was not substantial enough to rely on for support and was really there as a visual guide only. This, therefore, became a hindrance to the blind and others. Another obstacle is the staircase which projected into the ramped lobby, in the middle of the incline. This is an odd place for such an item and something you would not find on a ramped floor. Thus another barrier existed here.

Signage above the doors, leading to the trains, is misleading. At these doors, the threshold consisted of a raised metal plate which might prove an obstacle for crutch users and other semi-ambulatory travellers.

Once outside the terminal building, having gone through the inclined lobby, the train platform is covered the full length of any train in situ. This did not prevent snow from being pushed onto the platform, by approaching trains, and which could have been cleared more effectively from the platform area.

When boarding the train, the disabled traveller, who is confined to a wheelchair, is assisted by two redcaps or transport personnel. He is still in the wheelchair throughout this procedure and is normally taken onto the train with his back to the steps.

To board a train going in the opposite direction a tunnel, which goes under the tracks, is normally used. Steps lead down from the ramped lobby and up into a sheltered building on the other side of the tracks. At the time of testing this tunnel was not in use. It was being renovated and would, most likely, be opened for public use sometime in the near future. The wheelchair traveller, other disabled people and the remaining public, had to make their own way across the tracks (or with assistance if required), through the accumulated ice and snow.

6. Kingston Train Station — Summary

The entrance to this station is covered with an external canopy. This is necessary protection from the weather for all travellers. Single automatic doors lead into the building at the front and at the side. These doors are inward opening and activated by a pressure mat. The exit doors are to the side of each entrance. These are automatic, double doors and they swing outwards.

There is no cuing here for the blind to help distinguish in and out direction.

Once inside the station, after entering from either door, the position of the ticket counter is not obvious to either the blind or partially sighted (e.g. elderly). At the ticket counter, the counter height is reasonable for a standing person, but not for the person seated in a wheelchair. The telephones near the ticket counter are also too high for the person in a wheelchair, but there are others in the station which were more accessible.

Seating has no armrests and proved to be uncomfortable for some of our test travellers. The seats are constructed of laminated plywood which is an inappropriate material for general seating in a station waiting area. The provision of handrails on some of the seats would have assisted the elderly in getting up.

There were certain hazards on the floor of the terminal. The blind travellers experienced free-standing signs and telephones while finding their way around.

The typical lockers, bill changers and vending machines are also in use here. Coin slots, small pushbuttons and tiny lettering pose grave problems for the sight impaired and those with upper limb dexterity problems. One feature alongside the machines is a counter with a microwave oven underneath. Most items on the counter are not accessible for the wheelchair user and the microwave oven did not have a warning sign to caution those travallers who use pacemakers.

Washrooms have narrow doors and a small/narrow space just inside the door for circulation. There is no symbol on the door to the washroom to show that these were accessible. Inside there is a special cubicle for the disabled. In the cubicle no handrail is provided. The knee space under the washbasins is inadequate for the person who might be seated in a wheelchair and the mirrors are too high to be used by such a person.

The threshold to the washrooms is slightly raised and hampered the movement of wheelchairs, elderly and semi-ambulatory disabled.

Getting to the other side of the tracks proved difficult for some disabled people and virtually impossible for the wheelchair-bound person. The only way across from the main building was through a connecting tunnel which went underneath the tracks. Stairs on both sides are provided for those wishing to use the tunnel.

For the wheelchair traveller who wants to get to the other side, an arrangement has been made between the station and the local taxi company to pick up any person and his wheelchair and drive to the other side of the tracks, crossing the track at the main road. This could prove a discomfort for anyone not able to take the moving in and out of a car, not to mention the added expense for the rail company.

All others have to use the stairs and connecting tunnel to get to the small building on the other side. A telephone and seating are also provided in this building. There is no shelf under the telephone.

Unless one is able to park extremely close to the building, the car park, being uncleared of snow at the time, made it dangerous for most people getting from their car to the station.

7. Quebec City Airport — Summary

Access through the main doors of the airport was good as these doors were sliding, wide and with good pressure mats. Near the entrance, just inside the doors to the left, were the various ticket counters; only a short distance for any passenger to walk.

The ticket counters themselves were high for wheelchair users (1225 mm), but scales were positioned here to take baggage and this open space in the counter, over the scales, was used extensively by the agents to reach through to those passengers in wheelchairs. The display board showing arrivals and departures was not changed when a cancellation or delay occurred. There is no video display of this information anywhere in the airport.

Just opposite the ticket counter was seating where one could get documents out of baggage and prepare them before check-in. The seating also served the purpose of providing the traveller with a rest place to use immediately after check-in. This was a good place for orientation and preparing oneself for the next activity which was to be undertaken. Unfortunately, the type of seating proved to be a problem for the elderly. One gentleman had difficulty in getting up and needed to use a free-standing ashtray for support. The seat cushions, with depth of 150 mm, seemed just too soft and a person would sink into them making rising awkward for some. Armrests would have been beneficial in solving part of this problem.

The washrooms were situated not far from the ticket counter. The doors to the washrooms proved to be a problem for the disabled in a wheelchair and the reach of a seated person was not long enough to open the door without effort. Inside was a special cubicle for the disabled wheelchair user, with sink and grab rails provided. This was a particularly spacious facility. The door to the cubicle was similar to the main washroom door and might prove equally difficult to open for some seated in a wheelchair. A table, which had been placed in front of the cubicle door, became an obstacle for those trying to enter the cubicle.

The washbasins did not provide kneeroom if a person, confined to a wheelchair had to use the sinks, especially if the one cubicle for the disabled happened to be occupied. The towel dispenser was far too high for a wheelchair user. The colour scheme in the washroom was blue and this might be a bit confusing for the person who was disabled and who might be accustomed to looking for blue signs, etc. The symbol used for indicating accessibility to the cubicle was of an unofficial design.

The telephones were too high for the wheelchair user and the telephone directory was difficult to use by the person with gripping or holding problems. A directory is usually a heavy item and requires a good shelf or hanging system in order to be accessible to the special needs traveller.

There was no place to rest a "visual ear" device which is often used by the deaf and other hearing impaired persons.

Water fountains were of a modular design recessed into the wall. These were fabricated of brushed stainless steel.

The fountains were difficult to use by the disabled, especially those people with arm/hand problems. The faucet button was positioned too close to the side of the recess. The fountains were also too high for the wheelchair user and being recessed into the wall, they did not provide any knee clearance.

On departure, the traveller using a domestic flight, goes through the main glass doors to the appropriate gate and waits until he boards his plane. Seating is provided beyond the glass security barrier. The back-lit signage used to indicate gate number etc. is very clear.

For U.S. bound passengers, the procedure is similar and the passenger waits and then boards at the appropriate gate.

For the disabled passenger (especially if the traveller is in a wheelchair), there are two ways of getting him/her up to the plane. First of all the passenger is assisted by a ground hostess or attendant provided by the carrier and, depending on the disability, is handled in different ways.

If the passenger is ambulatory, then he/she is assisted up the stairs onto the bridge and into the plane. If the person is non-ambulatory and confined to his wheelchair, any unnecessary lifting is avoided and he/she is transferred in the wheelchair to the galley truck. The truck has an electric platform at the rear and has the edge ramped to make loading of a wheeled trolley or other device reasonably smooth. The wheelchair with the disabled passenger can thus be moved on or off with little effort.

The platform is then raised electrically and the disabled traveller is taken up approximately a meter in height. There are no guardrails to this rear platform and we doubt that it would conform with certain "passenger handling" safety regulations. The truck is then driven to just below the door of the plane.

Once wheeled inside the truck, which remains open at both ends throughout this procedure and does not contain suitable safety grab rails for either the attendant or passenger, the box is raised so the floor level is level with the threshold of the plane door.

The bridging platform between the truck box and the plane door has a guardrail on both sides, but is not covered.

Another way of getting the disabled passenger up to the aircraft (via the loading bridge) using one of the two available wheelchairs provided by Air Canada. One chair is, in fact, provided with a seat belt, handrims and stops on the footrests. The other wheelchair has no belt, no hardrims and no foot stops on the footrests. These chairs are approximately 25 inches wide.

These, in fact, can be used to take the traveller to the galley truck as previously mentioned, where he will be lifted up to the plane automatically. Otherwise, the wheelchair can be used to take the disabled traveller to the stairs of the loading bridge where he can then be transferred to a Washington chair and lifted up the stairs of the loading bridge, wheeled to the plane and then down the aisle to his seat.

When a disabled passenger deplanes, the procedure is reversed and she/he is assisted either onto the loading bridge and down the steps or onto the catering truck.

The disabled passenger is escorted, by carrier personnel through immigration and customs at all times. This is the case even if the person is ambulatory (using the blind as an example).

At the customs position, the disabled person, if in a wheelchair, is assisted in every way possible and is taken beyond the folding security screen once he/she has been cleared. At this point the disabled traveller waits, seated, while baggage is collected and then he/she is taken to the connecting transport which has been previously arranged, or assisted to a taxi or bus.

8. Cornwall Bus Depot — Summary

This depot, operated by the Voyageur Bus Company, is situated outside of the town of Cornwall. A special bus service is available for the handicapped, from town to the bus depot. Advance booking (approximately 48 hours) is required for this service.

The building itself was completed in 1980 and has one or two problems that have to be rectified. The first and major problem is that the concrete, just outside the entrance, is lifting causing the main entrance door to scrape and jamb when opened fully. This lifting is also disturbing the door threshold and floor tiling within the lobby area, just inside the doors.

We understand, from our enquiries, that this disturbance was caused by the extremely cold weather and that it will be mended in the near future. This concrete entrance and curb is also the loading and unloading level for all buses, with no protective canopy provided. The main doors are double, manual doors, which happen to swing outward. The inner doors, just on the other side of the tiled lobby, are an identical type and they also open outward.

Inside the depot building, the layout is quite straightforward with two rows of seating immediately inside the doors. To the right is the cab service office and open information/ticket counter and baggage/parcel check-in.

Beyond the ticket counter there is a wide, outward opening manual door (glazed) which is the entrance to the snack bar. The snack bar is of a good size with counter service from fixed stools (thirteen in number). There is no space at this counter for a wheelchair user and positioning a wheelchair at either end would impede movement of either customers or staff or both.

There is also bench seating and tables, but once again, no provision for the wheelchair user or other disabled customers, has been considered. A wheelchair placed at the end of any of the tables would interfere with service and the movement of other customers between booth and counter.

The telephones are situated at either end of the entrance lobby and are not suitable for a wheelchair user and some of the other categories of disabled travellers.

A washroom is the only other facility provided for travellers using the depot. The washbasin is not suitable for wheelchair users and the type and position of other items require reviewing against acceptable guidelines and standards.

There was a toilet cubicle for a wheelchair user, but no handrails were provided to assist the occupant.

Finally, when boarding or leaving a typical bus, all travellers have to contend with the fact that the distance from concrete curb to the first step of the bus, is 340 mm (13⅜"). The maximum acceptable standard for a step rise in public buildings used by the disabled, is approximately 178 mm (7"). Why is the distance greater for public transport? This fact creates a barrier and a danger for those people attempting to use the transportation mode.